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# *Archives of* PHYSICAL MEDICINE *and* REHABILITATION

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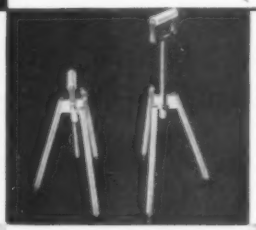

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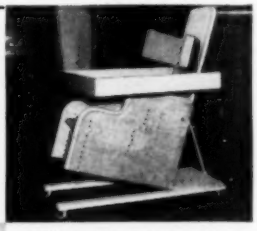

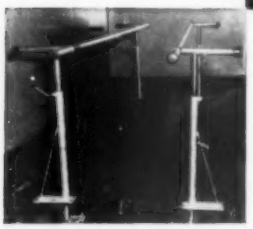

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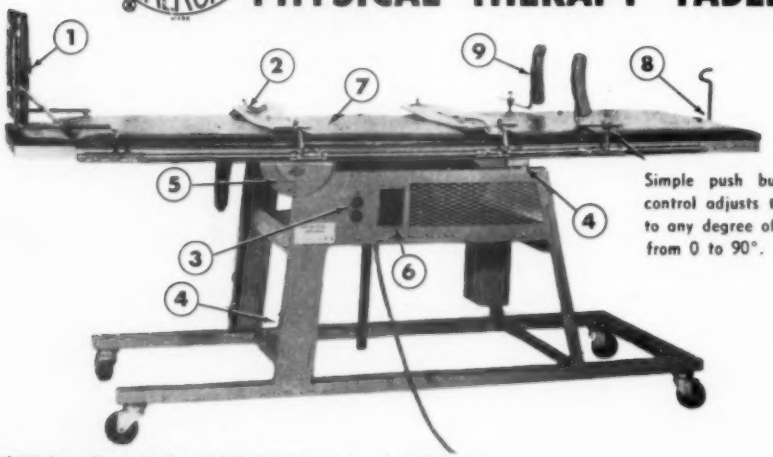


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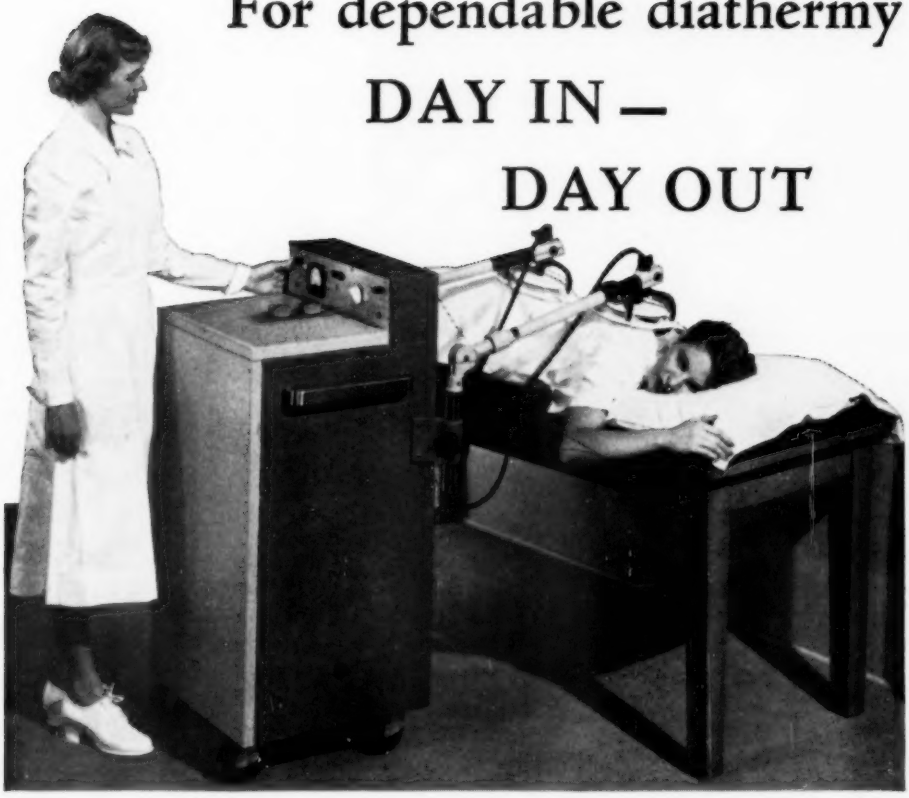

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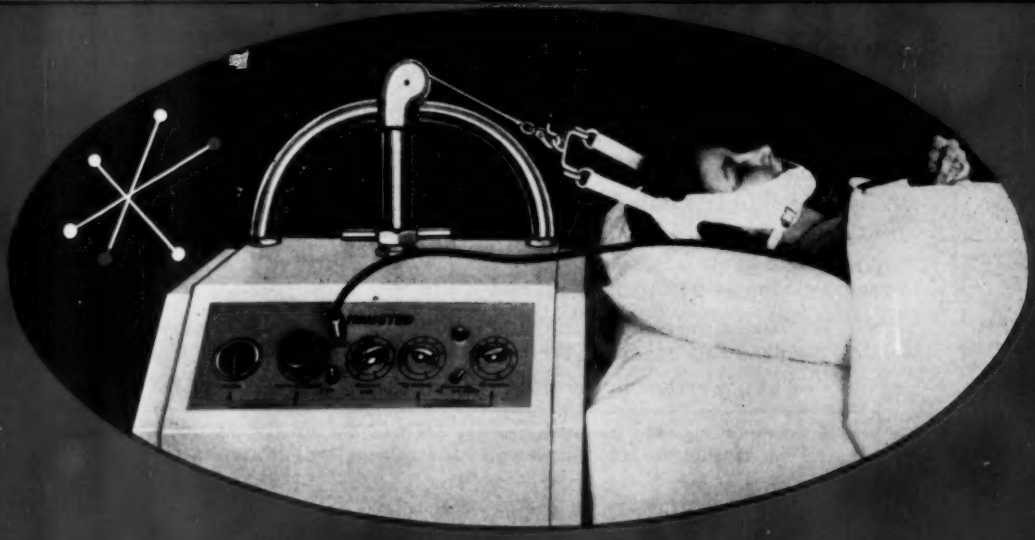

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## CHRISTIANSBORG CASTLE

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# *Scientific Program*

**MONDAY, August 20, 10:00 a.m.**

The Opening Ceremony in the Festival Hall of the University of Copenhagen, Frue Plads, Copenhagen K.

The lighting of the Ceremonial Lamp by the President of the International Federation of Physical Medicine.

Installation of the President of the Congress by the President of the International Federation of Physical Medicine.

Presidential Address: Dr. Sv. Clemmesen.

Speech of Welcome by the Chairman of Dansk Fysiurgisk Selskab, Dr. Ole Sylvest.

Lecture by Dr. Sv. Clemmesen.

**MONDAY, August 20, 2:30 p.m.**

Subject: **The Heat Regulation and Peripheral and Central Circulation as Basic Problems within Physical Medicine.**

*Chairman:* Professor Ejnar Jarlov, M.D., Denmark.

**TUESDAY, August 21, 10.00 a.m.**

Subject: **The Striated Muscle. Clinical and Physiological Problems in Relation to Physical Medicine.**

*Chairman:* Professor K. M. Walthard, M.D., Switzerland.

**WEDNESDAY, August 22, 10:00 a.m.**

Subject: **Rehabilitation.**

*Chairman:* Frank H. Krusen, M.D., U.S.A.

**THURSDAY, August 23, 10:00 a.m.**

Subject: **Clinical Communications.**

*Chairman:* L. T. Wedlick, M.D., Australia.

**FRIDAY, August 24, 10:30 a.m.**

General meeting of the International Federation of Physical Medicine. Report from the Honorary Secretary, Ph. Bauwens, M.D.

Closing ceremony by the President, Sv. Clemmesen, M.D.

---

**Detailed information regarding this meeting may be had from the Office of The Secretary General: B. STRANDBERG, M.D., KOBENHAVNS AMTS SYGEHUS, HELLERUP, DENMARK.**

# Relation of Ultrasound Effects to the Orientation of Tendon in the Ultrasound Field

Jerome W. Gersten, M.D.

*Denver*

In an earlier study it was noted that when normal frog muscle was exposed to ultrasound the water content increased; when tendon was treated in similar fashion, water content decreased.[1] In that study the long axis of the tendon was perpendicular to the ultrasound field. One of the suggestions offered in an attempt to explain this difference between muscle and tendon after exposure to ultrasound was that, since the normal direction of passage of fluid along connective tissue fibrils was in the longitudinal direction,[2] the application of ultrasound at right angles to the axis of the tendon might force water out of the tendon. This would be pertinent because of the general tendency for the collagen bundles to be oriented longitudinally.[3, 4] In order to determine whether the orientation of tendon played any role in its response to ultrasound, a series of observations was made in order to determine changes in water content of tendon when its long axis was parallel to the ultrasound field. After it had been determined that the change in hydration did indeed differ qualitatively when the orientation was changed, the study was extended to include effects on extensibility. From previous observations with tendon sonated at right angles to its long axis, it was shown that only when significant temperature rises were produced was the extensibility of the tendon increased.[5] In this study changes of tendon extensibility in the ultrasound field were again analyzed, but with the tendon oriented parallel to the ultrasound field.

## Method

The experiments were carried out on Rana pipiens for a period of four months. The frogs were kept in running tap water at a temperature of approximately 20 C. before use. Immediately after high level cord section, both Achilles tendons were removed and placed in cold (approximately 5 C.) Ringer's solution that had previously been degassed. One tendon was fixed so that its long axis was parallel to the ultrasound field, and the end that had been proximal in vivo was closer to and 2 mm. from the sound head, in the region of maximal ultrasound field. The other tendon, as determined by a thermistor probe, was outside the ultrasound field and served as control. The system was then evacuated, and one tendon was exposed to ultrasound (Birtcher Model U Ultrasound Unit) at an average intensity of 3 watts/cm$^2$ during the on period, and a frequency of 1 megacycle per second. Details of this technic are described elsewhere.[6] The output was pulsed in rectangular fashion, with a 1 millisecond on period and a 2 millisecond off period. In studies of water content, the duration of exposure varied between ½ and 5 minutes, while in extensibility studies, the duration was fixed at 3 minutes.

After completion of the sounding, control and test tendon were carefully dried with filter paper, weighed on a torsion balance, and then dried to constant weight in vacuo over phosphorus pentoxide at room temperature. In alternate experiments, control and test tendon were weighed first. Per cent solids was then computed by dividing the dry weight by the wet weight and multiplying by 100.

Length-tension curves, as an index of extensibility, were obtained in two different manners. In both, a slope of lower degree indicated greater extensibility. In the first, the entire tendon was examined,

Read at the Thirty-third Annual Session of the American Congress of Physical Medicine and Rehabilitation, Detroit, August 30, 1955.

Associate Professor, Physical Medicine and Rehabilitation, University of Colorado, School of Medicine.

using a technic described elsewhere.[5] Briefly, the length of the tendon was varied continuously, and the tension at each length was measured by coupling the output of a strain-gage system, to which one end of the tendon had been fixed, to a Leeds-Northrup D. C. amplifier.

When it had been determined that changes in extensibility could be produced when the tendon was oriented longitudinally in the ultrasound field, despite the fact that no temperature rise could be recorded with a copper-constantan thermocouple inserted into the tendon at its most proximal point, a technic was devised for obtaining length-tension curves of small segments of tendon, so that the depth of the effect could be ascertained. In order to avoid damage to the tendon, temperature studies were not carried out on tissue that was later to be examined for extensibility. The technic described in the previous paragraph was not applicable to the small pieces of tendon used in this phase of the study. Instead of varying the length of the tendon and measuring the resulting tension in the second technic used, the force applied to the tendon segment was gradually increased and the resulting change in length was recorded.

In this second technic, small sections of tendon were removed immediately after sounding was terminated, and extensibility studies were carried out. The sites from which the small pieces of tendon were removed may be noted in fig. 1. In *A* the segment immediately adjacent to the sound head was examined; in *B* the proximal 2 mm. was discarded and the next section of tendon was studied; in *C* the proximal 4 mm. was removed. In *D* the tendon was oriented at right angles to the ultrasound field, and the segment closest to the sound head was analyzed. This latter group of experiments was performed to rule out the possibility of local changes in extensibility that might have been masked in the previous study[5] in which the whole tendon was used. A fifth group, *E*, not included in figure 1, was later introduced. In *E* the orientation was longitudinal, and the proximal 6 mm. of tendon was discarded. To get the desired piece of tendon, the barred area shown in figure 1 was removed and placed in a specially constructed microtome that provided a segment 1 to 2 mm. long and 0.5 mm.$^2$ in cross section.

A length-tension curve for this tendon segment was then obtained by using the apparatus diagrammed in figure 2. The tendon segment *(A)* was fixed between two clamps. The lower clamp *(B)* was stationary, the upper one *(C)* moved with the lever. The attachment of clamp *C* to the lever was made so that its position was always vertical. Each clamp grasped approximately 0.5 mm. of tendon. The length between the two was measured with a vernier caliper. Loads were then applied at point *D*. From the relation between force and resistance arm it can be seen that the actual force at the tendon was five times greater than the force applied at *D*. The change in length of the tendon could then be calculated by noting the deviation at *E*, since the distance gain was 11.11.

A fine stream of air, saturated with

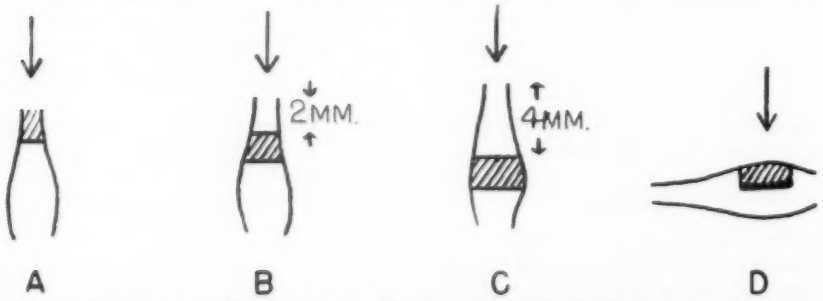


Fig. 1 — Region of tendon for which length-tension curves were determined. The long vertical arrows indicate the direction of the ultrasound field, the barred segment the section of tendon from which pieces were removed for examination.

Fig. 2 — Diagram of lever system used to determine length-tension curves for tendon segments. Figures refer to distance from the fulcrum, in centimeters. See text for detailed description.

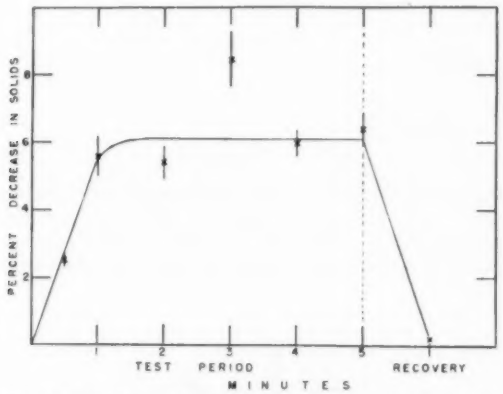


Fig. 3 — Effect of ultrasound on hydration of tendon. Sounding was stopped at the point indicated by the vertical broken line. The solid vertical lines represent one standard error from the mean percentage decrease in solids.

water vapor, was gently sprayed around the tendon during the observations in order to minimize loss of water from the tendon. The force of the stream was too small to affect the observations.

## Results

*Changes in Hydration (46 Experiments, Fig. 3):* When the tendon was removed from the Ringer's solution within 10 seconds after stopping ultrasound (38 experiments), there was a consistent and significant decrease in the percentage of solids. In 34 of these 38 experiments there was a decrease in the percentage of solids. In 3 there were slight increases (0.6, 1, and 2.3 per cent), and in 1 there was no change. This increase in water content differs from the decrease noted when the tendon was sounded at right angles to the ultrasound beam.[1] As in the previous study, however, the process was reversible, for if the tendon were kept in the cold Ringer's solution in vacuo for 1 minute after sounding was stopped, the degree of hydration of control and sounded tendons was approximately the same (recovery period in fig. 3).

In all these experiments no temperature rise was recorded by a copper-constantan thermocouple during the sounding period.

*Extensibility Changes of Entire Tendon:* When tendon was sounded for 3 minutes at 5 C. and tested immediately after sounding was completed, a significant increase in extensibility was noted, even though no rise in temperature could be recorded (11 experiments, fig. 4). No attempt was made to measure the elastic limit or the breaking point. When the tendon was allowed to remain in the Ringer's solution for 1 minute before extensibility was tested the increase in extensibility was still apparent (7 experiments, fig. 4). Although the hydration change was reversible within 1 minute, the change in extensibility was not.

Since an increase in extensibility could be produced by ultrasound without a measurable rise of temperature, provided that the orientation was correct and the intensity high enough, further studies

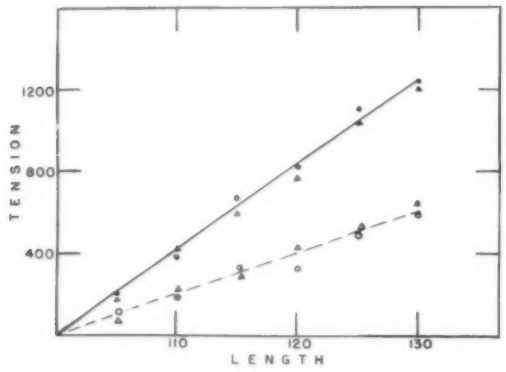


Fig. 4 — Effect of ultrasound on extensibility of whole tendon. The ordinate refers to the tension in grams, the abscissa to the relative length, with rest length equal to 100. The solid line represents the length-tension curve of control tendon, the broken line the curve of sounded tendon. Circles represent values obtained immediately after sounding was terminated; triangles, values obtained 1 minute later.

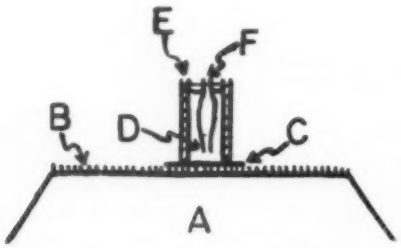


Fig. 5 — Diagram of technic used to sound tendon (*F*) in testicular hyaluronidase (*D*) or saline solution (*D*). *A* represents the sound head; *B* the mineral oil coupling. The plastic cylinder containing the solution was 3.6 mm. in diameter, with floor (C) 0.2 mm. and wall (*E*) 1.1 mm. thick.

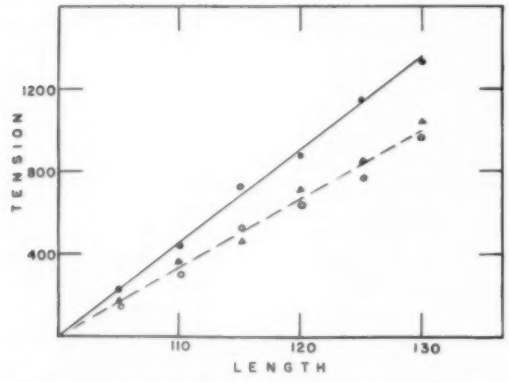


Fig. 6 — Effect of ultrasound on extensibility of whole tendon. Ordinate and abscissa as in figure 4. Solid circles refer to control tendon; open circles, to tendon sounded in saline solution; triangles, to tendon sounded in testicular hyaluronidase.

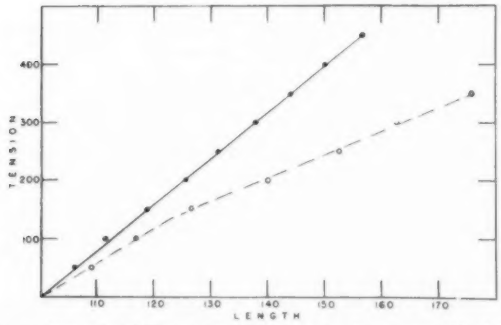


Fig. 7 — Effect of ultrasound on extensibility of proximal 2 mm. tendon segment (A of fig. 1). Ordinate and abscissa as in figure 4. Solid circles refer to control tendon; open circles, to sounded tendon.

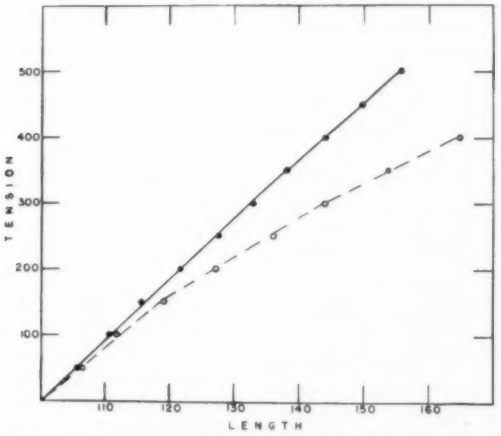


Fig. 8 — Effect of ultrasound on extensibility of tendon segment (B of fig. 1). Ordinate and abscissa as in figure 4. Solid circles refer to control tendon; open circles, to sounded tendon.

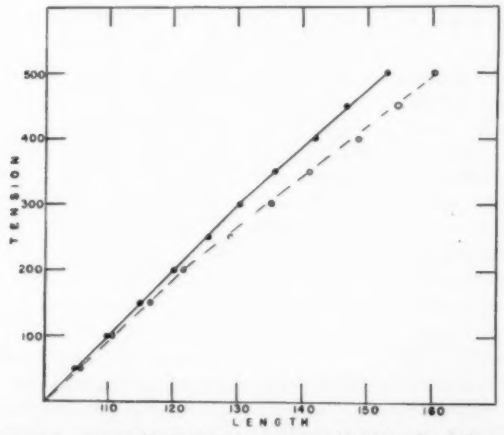


Fig. 9 — Effect of ultrasound on extensibility of tendon segment (C of fig. 1). Ordinate and abscissa as in figure 4. Solid circles refer to control tendon; open circles, to sounded tendon.

were carried out with testicular hyaluronidase (Wydase), at a concentration of 150 turbidity-reducing units per cubic centimeter, to see whether the effect could be enhanced.

In order to keep the volume of hyaluronidase small (approximately 0.1 cc.), the first observations were made by using the technic illustrated in figure 5. These experiments were performed in air, with no provision made for cooling. As noted in figure 6 (27 experiments), an increase in extensibility was produced with 3 minutes of pulsed irradiation at 3 watts/cm.$^2$; however, there was no difference between the changes produced in Ringer's solution and in hyaluronidase. Furthermore, the change in extensibility was of smaller magnitude than that produced at a lower temperature with direct coupling of Ringer's solution. Presumably the intervention of mineral oil and the plastic sheeting (not designed for maximal energy transmission) resulted in a smaller ultrasound intensity at the tendon. Since this could not be measured with any degree of accuracy, the problem was not developed any further.

In 12 experiments, larger volumes of solution were used and observations were made in vacuo, at an average temperature of 7.1 C. Again, an increase in extensibility was produced by ultrasound and no difference was noted between studies carried out in Ringer's solution and in hyaluronidase.

*Extensibility Changes of Small Sections of Tendon:* The extensibility of proximal tendon segments was tested in 50 experiments. The mean length of the control sections was 1.21 mm., while that of the test segments was 1.24 mm. As noted in figure 7, there was a significant increase in extensibility after exposure to ultrasound, without any measurable increase in temperature ($p < .001$). The order of magnitude of this change was similar to that noted when whole tendon was tested, suggesting that the effects on the proximal end of the tendon overshadowed the deeper effects.

Extensibility of tendon segment 2 mm. from the surface was tested in 28 experiments (fig. 8). The mean length of control tendon was 1.19 mm. while that of the test segment was 1.15 mm. The extensibility was again significantly greater in sounded than in control tendon, but the magnitude of this increase was less than in the group in which the proximal section of the tendon was tested ($p < .001$). Furthermore, the control extensibility was slightly smaller than in the more proximal region.

Extensibility of tendon segment 4 mm. from the surface was tested in 27 experiments (fig. 9). The control tendon length averaged 0.99 mm., while the test sections averaged 0.96 mm. The trend toward a decrease in extensibility of the control as one progressed distally in the tendon continued here. The increase in extensibility produced by ultrasound was far smaller than in regions closer to the ultrasound head, and significant differences ($p < .03$) were apparent only after the elastic limit of the sounded tendon had been exceeded.

Extensibility of tendon segment 6 mm. from the surface was tested in 22 experiments. At this depth no difference was noted between control and sounded tendons.

In all of the above experiments the tendon was oriented parallel to the ultrasound field. In previous studies with cooled tendon oriented perpendicular to the sound field, no increase in extensibility was produced. Since it was possible that in observations of the entire tendon local changes might have been missed, experiments were performed on small sections of tendon with this right angle orientation (*D*, fig. 1). Small sections of tendon in the region of the maximal sound field were examined, with a mean control length of 0.94 mm. and a mean test length of 0.80 mm. From figure 10, which indicates the average of 25 experiments, it may be noted that in this position ultrasound had no effect on extensibility when temperature elevations were prevented.

## Discussion

The system used in this study was, in a sense, an artificial one, since cutting of the tendon created an open end that presumably did not exist before. Whether there is any applicability to tendon in

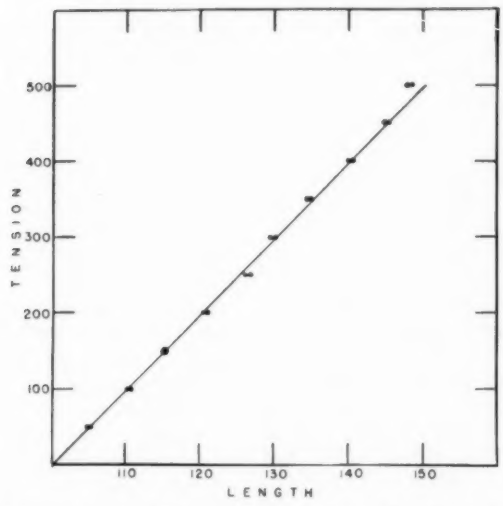


Fig. 10 — Effect of ultrasound on extensibility of tendon segment (*D* of fig. 1). Ordinate and abscissa as in figure 4. Solid circles refer to control tendon; open circles, to sounded tendon.

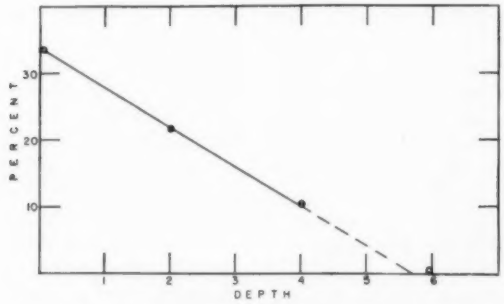


Fig. 11 — Depth of ultrasound effect. The ordinate refers to the per cent of increase in extensibility; the abscissa, to the distance from the proximal end of the tendon, in millimeters.

vivo must await further experimentation. If nonthermal effects of this type are not possible in the human, we may still expect changes in extensibility dependent upon heating, as described previously.[5]

In any case, one explanation for the difference in behavior between muscle and tendon as regards uptake of water in the ultrasound field is the manner of passage of fluid along connective tissue fibrils. McMaster and Parsons[2] noted that injected blue dyes passed along the surface of connective tissue fibrils, and that the rate of such movement was enhanced by the application of external mechanical forces. It is possible that radiation pressure at the fluid-tendon interface, small though it is, may serve as the mechanical force that squeezes fluid along the fibril surface, and thus decreases the water content when the tendon orientation is at right angles to the ultrasound field.

When the tendon lies parallel to the ultrasound field, the mechanical effect of radiation pressure no longer seems likely. The process of fluid streaming[7] seems to offer a more plausible mechanism for the consequent increase in water content of the tissue in the longitudinal position. As noted in figure 3, a steady state is reached within 2 minutes of the start of sounding,

and no further change in water content is noted during more prolonged sonation. This probably results from an increase in tissue pressure as water content increases, with a resulting force that opposes the ultrasonic forces, and the establishment of a balance. After sounding is terminated, this increased tissue pressure is now unopposed, which results in a return to the normal state of hydration. Previous studies have indicated that these changes in water content in the ultrasound field are produced mainly by physical factors and not by any effect on metabolic processes. As will be noted subsequently, however, depolymerization may result in an increase in the uptake of water under certain circumstances. There is no direct evidence for or against this possibility. It does seem unlikely, however, in view of the rapid uptake of water and the very rapid loss of water from the tendon when sounding was stopped.

Also noted were differences in extensibility between tendon oriented at right angles to the ultrasound field and tendon oriented parallel to the field. In a previous study[5] it had been shown that when tendon was perpendicular to the ultrasound field the only effects on extensibility were those that accompanied temperature rises in the tendon. Presumably, thermal denaturation of tendon proteins was associated with, and responsible for, the extensibility increase.

In this study, an irreversible increase in extensibility was noted without any measurable temperature rise, but only when orientation of tendon was parallel to the ultrasound field. Rollhauser has shown that extensibility of connective tissue was increased when water content increased.[8] If this were a factor in the extensibility increase noted here, it probably was not the major one, because even when water content was restored to normal levels, an extensibility increase was still manifest.

The conditions of the experiment were such that cavitation was prevented or minimized; however, it is possible for shear forces to depolymerize macromolecules,[9] although these shear forces are not as efficient as the forces resulting from cavitation in producing such molecular breakdown.[10] Thus, with only shear forces operating, only weaker bonds would be broken, and only in chains that are long and have a high initial molecular weight.[10] Since it is not known just which bonds are broken under the circumstances of this experiment, the forces required cannot be predicted, but both collagen and mucopolysaccharide ground substance are long molecules and presumably might have linkages that are weak enough to be broken by the strong forces in the ultrasound field.

Although changes in tensile strength of connective tissue have been related primarily to effects on collagen, the mucopolysaccharide ground substance may also have to be considered.[11] It was in an attempt to determine the relative importance of these two molecules, as far as extensibility change was concerned, that the experiments in which testicular hyaluronidase was used were carried out. Chondroitin sulfate B and C are present in tendon of the pig and calf,[12] with the latter hydrolyzed rapidly by testicular hyaluronidase. If a signficant increase in extensibility followed sounding with testicular hyaluronidase present, this might give some clue as to the types of linkages broken by ultrasound. Actually, the results were inconclusive. The lack of effect of testicular hyaluronidase may have been caused by depolymerization of the enzyme by ultrasound,[13] by the relatively greater importance of chondroitin sulfate B, which is not affected by hyaluronidase, by failure of the enzyme to penetrate the tendon under the circumstances of the experiment, or by lack of significance of the mucopolysaccharides in relation to tensile strength and extensibility.

As noted previously, depolymerization of these large molecules is often associated with an increase in water content of the tissue.[14, 15] If this were the sole mechanism for the increased water content of tendon noted in this study, there should not be such ready reversibility.

It was hoped that study of the depth effect might throw some light on the general mechanisms involved in the extensibility increase, although not necessarily on specific molecular linkages affected. This was based on the assumption that a purely thermal effect would de-

cline exponentially, while a pressure effect would decline linearly. As seen in figure 11, the decrease in extensibility effect was indeed very close to linear. The broken line beyond 4 mm. depth is an index of the uncertainty of the exact point at which the curve reaches zero. This, combined with the absence of temperature rise as recorded with a thermocouple, would tend to point toward a nonthermal effect by ultrasound. It must be noted, however, that the assumptions made remain to be proved conclusively under these particular experimental circumstances, and that the experimental technic is not sufficiently accurate to determine with certainty that the decline is linear.

## Summary

When tendon in vitro is oriented parallel to an ultrasound field a reversible increase in water content and an irreversible increase in extensibility are noted. These changes are produced without any measurable rise of temperature in the tendon. Sounding in the presence of testicular hyaluronidase does not produce any greater increase in extensibility than does sounding in saline solution. Extensibility increase is greatest in the segment of tendon closest to the ultrasound head, the effect decreasing linearly with depth.

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**The Committee on Advances in Education is interested in receiving comments from Congress members relative to its activities. Suggestions should be directed to the Chairman, Donald L. Rose, M.D., Dir., Dept. of Physical Medicine, University of Kansas Medical Center, Kansas City 3, Kansas.**

# A Bowel Training Program in a Rehabilitation Center

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Proper bowel control is an unconcious need of every human being, preponderantly so in patients whose neurologic or muscular defects threaten return to an infantile status.

Even in so-called normals, bowel function is surrounded by a penumbra of superstitions, fetishes, weird habits, and Freudian overtones and is often far from "normal." The difficulties are illustrated by the fact that we do not have adequate definitions of terms like "normal bowel function," "constipation," "diarrhea," and the like.

This paper will review briefly the physiology of defecation, the levels of disturbance of bowel function in neurologic disorders, and a practical program of ward training. Failure to carry out a training program can imperil the entire rehabilitation process because of the patient's anxiety about constipation and fecal incontinence, recurrent impactions, and disturbances of ward routine.

## Normal Defecation

The descending colon, sigmoid, and rectal ampulla are supposed to be empty during most of the time. Once or twice a day the haustrations flatten, the colon seems to straighten and elongate, and fecal material from the cecum and ascending colon is propelled suddenly into the ampulla. Here the parallelism between bladder and bowel function becomes nearly exact. There are pressure-sensitive receptors in the bowel. A rising tempo of impulses from these afferent receptors passes through the pelvic nerve to the second, third, and fourth sacral cord segments. Some of these sensations pass up the cord to reach consciousness in the cortex. Others stimulate reflexly the respiratory and abdominal wall muscles, which contract and further increase the intra-ampullar pressure. Closure of the glottis traps air in the thorax so that operation of the expiratory muscles raises the intrathoracic and intra-abdominal pressure instead of emptying the lungs.

When the rectal pressure reaches about 50 or 60 mm. Hg. the internal and external sphincters reflexly dilate, providing a channel with low terminal pressure which facilitates passage of the mass of feces outward. At the same time the levator ani muscles rise into the pelvis over the fecal bolus, and the rectal walls contract and shorten, driving the bolus downward. The fecal column is then snipped off as with a shears by the combined action of the pubococcygeus muscles and the anal sphincters. This sequence is repeated until the sigmoid and rectum are empty.

The sacral division of the parasympathetic system is the key part of nervous control. The body can dispense with conscious straining and does so in coma. Conversely, voluntary inhibition can nullify the normal sequence for long periods of time, the ampulla remaining full of feces.

## Levels of Neurologic Defect Affecting Defecation

*Cortical Level:* Conditions such as coma and senility remove awareness of defecation, which proceeds automatically. Whether specific cortical centers for defecation exist is not clear. The paracentral lobule is said to be such a center for micturition. Patients with severe frontal lobe damage and loss of social inhibitions may show fecal incontinence:

A 45-year-old grocer had successful removal of a vascular malformation from the right frontal lobe. He was severely hemiplegic on the left side. He either would not ask for the bedpan or would defecate in the bed seconds before it arrived. Psychologic exami-

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Medical Director, California Rehabilitation Center.

nation revealed excellent preservation of many brain functions and severe damage to others. The "social quotient" was very low as was manifested also by broad sexual hints to nurses, a type of behavior quite alien to his pre-illness character.

*Bulbar Level:* A defecation center has been tentatively identified in the floor of the fourth ventricle. It is second in the hierarchy of control and is probably a coordinating point. Thus sudden mobilization of the body for a physical stress accompanied by such emotions as fear or anger (predominantly a sympathetic response) would result in complete paralysis of an early defecation phase; however, extreme terror can produce involuntary evacuation of the bowel. Collapse of cortical control probably releases voluntary trunk musculature and other mechanisms of the act normally under partly voluntary direction.

A 46-year-old man received a head injury without fracture in an auto accident, which left him comatose for 5 days. After regaining consciousness he showed a spastic quadriparesis with pseudobulbar palsy and forced laughing and crying. He required a tracheotomy, tube feeding, and inlying bladder drainage. He was very distressed because he could not restrain spontaneous defecation in the bed. After a few weeks he regained control.

This case represents release of cortical control of the bulbar defecation center. Instances of destruction of the center itself ordinarily are not encountered because the associated injuries would cause death.

*Upper Spinal Cord Level:* The four major possibilities of defects in the upper spinal cord affecting defecation are loss of motor efferent tracts to sacral cord, loss of afferent tracts from rectum to cortex (and consciousness), complete loss of both, and incomplete lesions of one or both types.

Most patients with bowel problems in rehabilitation centers belong to this group and are exemplified by the traumatic spinal paraplegics and quadriplegics. The sacral reflex mechanisms are intact but freed completely from cortical awareness and control; the patient may feel that defecation is due but may have no voluntary muscles at his command to assist the act and no control over the external sphincter to stop it at will. The external sphincter usually has residual, although not normal, tone.

*Level of The Sacral Autonomic Nerves:* The four main possibilities of injuries to the sacral autonomic nerves affecting defecation are loss of afferent nerves, as in tabes; loss of efferent nerves, as in early poliomyelitis with sphincter involvement; loss of both, as in destruction of the sacral cord or section of the pelvic and pudendal nerves; incomplete losses of one or both.

Megacolon, resulting from nonformation of a ring of rectal innervation, is in some respects the counterpart of tabes, with its huge, insensitive bladder.

The type of patient most likely to be seen, however, is the child with myelomeningocele and failure of primary innervation of the entire voiding and defecating apparatus. The sphincters are dilated and nonfunctioning and the infantile female urethra will sometimes admit an examining finger; the anus gapes. In effect these are two primitive cloacas which admit and passively drop by gravity their burdens much as does a bird.

In addition to segmental neural lesions, bowel problems result from weakness or paralysis of the diaphragms, the abdominal wall, the levator ani, and other pelvic floor muscles. Deformity, trunk weakness, or pseudospontaneous spasms may preclude sitting in the physiological position and enlisting the aid of gravity. In total quadriplegics practical exigencies may force the use of the abhorred bedpan. Fortunately most poliomyelitis patients make excellent trainees for good bowel function.

### Bowel Control Training Program

In order to achieve a successful program of bowel control the physician must first determine the nature or level of the physiological defect. Personnel must have a clear understanding of procedures to be followed and patients must be carefully indoctrinated before and during bowel training. Adequate physical facilities must be available.

Fortunately two facts make bowel training much simpler than the parallel problem of bladder management. Firstly,

training can be basically similar, with obvious exceptions, throughout the various types discussed. Secondly, only destruction of the bowel itself will stop bowel function; the parasympathetic system known as the myenteric plexus ultimately would take over and carry out peristaltic activity and fecal elimination even if most of the spinal cord and its roots were removed surgically.

*Objectives:* The objectives of the bowel training program are normal bowel function, if possible; if impossible, the prevention of fecal incontinence, diarrhea, impaction, and irregularity. The patient should become independent of help from nurses, attendants, or family, or failing that, he should require the absolute minimum of help, and resort to the bedpan in few instances. He may have to surrender to the enema habit (far from a humiliating capitulation) when all other resources fail.

*Regularity:* Patients cannot be permitted the vagaries of habit of so-called normals. A colon habituated to a 48 hour cycle or an 8 hour cycle can be re-trained to function on a 24 hour basis. If possible, however, the pre-illness pattern should be followed. The patient's future work plans and the physical facilities that will be available also need to be considered.

*Timing:* Use should be made of the gastrocolic reflex, that is, the patient should be sent to stool 20 minutes or so after a meal — which meal depends on treatment schedules, ward routine, and available toilets and commodes. The same time, of course, must be employed each day for a given patient.

*Cues and Stimuli:* Traumatic paraplegics and quadriplegics sometimes get autonomic signals, such as pseudospontaneous spasms, peculiar tastes, or headache, as clues that the rectum is full. Since regularity is necessary, these "cues" must be inhibited and ignored unless occurring near the appointed time. The time-honored stimuli are used if nothing happens when patient is at stool: a hot cup of tea or coffee, a cigarette, local irritation of the rectal canal by a glycerin suppository or the finger in a lubricated cot. A Fleet enema may be used to begin training. Rubbing the thighs or abdomen and clasping hands tightly may be tried.

*Position:* The physiological posture of uninhibited and primitive human beings for defecation is the squat; however, some patients are physically incapable of squatting, even if bathroom furniture permitted. The squat can be copied to some extent on an ordinary toilet or commode, especially if a small stool is placed under each foot. The patient should lean forward, if possible, thus reinforcing abdominal compression by pressure of the thighs. Built-up toilet seats, sometimes advocated for ease of chair transfers, place the patient in a less physiological position than does the standard bowl height. Some patients need arm rests because of trunk weakness.

*Fluid Intake:* Within wide limits bowel function is independent of fluid intake. A 6 oz. glass of prune juice or hot water with lemon on waking has good suggestive, perhaps even some slight pharmacologic value.

*Drugs:* Use of drugs is normally avoided. For persistent atony, during a period of training, it would be reasonable to employ a parasympathomimetic agent, such as neostigmine. Castor oil is used solely for preparation for roentgenographic examination.

*Physical Facilities:* Privacy and leisure are essential to the mental serenity that goes with successful defecation. A line-up outside the toilet door each morning or the privacy accorded by only a canvas curtain are conditions that could ruin the best bowel training plans. In hospitals not originally designed for rehabilitation needs, additional toilets must be installed and commodes provided so that morning procedures can be concluded in time for treatment in the gym or elsewhere. Warmth, lack of noise, and good ventilation are other desirable features.

*Enemas:* Patients must be watched for impaction. Enemas are used in such cases and also in preparation for proctoscopy and in searches for parasites. Soapsuds are too irritating and physiological saline solution too bland for routine use. Tap water at body temperature is about right. To prevent reflux in the presence of incompetent sphincters,

a sponge rubber ball with a standard rectal tube passed through a hole in the center may be used. In impactions, mineral oil can be used to soften scybalous masses. If no result occurs in normal bowel training, a tap water enema is given on the third day, and the procedure started again.

Sometimes patients refuse to cooperate with bowel training. Inadequate orientation by the physician, lack of comprehension or follow-through by ward personnel, or inadequate physical aids may be to blame. Patients, especially elderly women, sometimes have fixed prejudices about defecation habits that are impossible or unwise to upset as they often are based on deep-rooted complexes. It is best not to make an emotional issue of these matters but to place them on the plane of the patient's own convenience. He is the one on whom ultimate responsibility rests and must ultimately decide on how simple he would like this function to be. In our center each patient is oriented as speedily as possible toward graduation from ward-care to self-care status (without nursing). Ability of the patient to manage his own bowel function is a necessary part of such progression and seems to solve most problems. As intimated previously, the enema habit, twice or three times weekly, is the solution most desired by some of our paraplegics. We do not protest too much, providing the patient can handle all aspects of it by himself.


### Summary

The need has been emphasized for a coordinated in-training program on bowel function for all members of an in-patient rehabilitation team, especially for nurses, orderlies, and aides. The physician in prescribing departures from the established bowel routine must recognize the level or area of physiologic impairment, which may involve the cortex or any level below that down to the bowel wall. The program involves indoctrinating the patient in the importance of regularity, timing, special stimuli, and position. Any bowel program must be continuously revised and improved as usages become outmoded and personnel gradually are replaced. Knowledge concerning the physiology of brain and spinal injuries in man is empirical and incomplete; considerable revision is needed before better schemes of rehabilitation can be worked out.



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# Afferent Influences in the Management of Spastic Paresis

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and
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Movement and perception are the basic functions of the nervous system. Perfect coordination between the two is necessary to produce movements. As nothing occurs without a cause, muscular action should not be considered as occurring without a cause and also more than the motor side of reflex arcs must be considered in diseases that produce spastic paresis. An isolated motor center obviously cannot exist without a sensory mechanism, as in such a situation there would be no afferent stimuli for the production of effector relays. In discussing the effects of such a de-afferentation, Lassek[1] has recently shown that total volitional paralysis of the limb occurred even at a time when the effector mechanism responded normally to electrical stimulation of the cortex. Hence, it would appear that the cortex, when deprived of afferent impulses from the limb, is incapable of utilizing intact central and peripheral efferent (motor) pathways to initiate voluntary movement. Walshe[2] has summarized this concept of a sensorimotor cortex as follows: "It is essential, therefore, to stress the importance of the idea of the receptor system as initiating and directing willed movement in contrast to the widespread assumption that we may usefully contemplate the physiology of movement as starting *ab initio* from a mechanically conceived 'keyboard' in the motor cortex."

Sherrington[3] believed that the afferent system initiated, controlled, and dominated motor behavior at all levels, while Walshe described willed movement as being molded throughout its course by impulses derived from the receptors. Similarly Walshe has consistently sought to detract from the position of primacy with which many authors have endowed the pyramidal system. He described it as being an "internuncial, a common pathway by which the sensory system initiates and continuously directs, in willed movements, the activities of the nervous motor mechanisms." The comprehensive work of Gooddy[4] also supports this view. Gooddy also maintained that the motor cortex should no longer be considered the dominant region in the execution of voluntary motion. He rather aptly described the motor cortex as being "taught" to perform movements by the receptors. In the absence of afferent stimuli, nothing is "known" to the so-called motor cortex. It is equally evident that motor centers lower than those in the cortex are also dependent on afferent signals from the receptor system. Sherrington described this afferent dominance in the initiation and control of motor behavior at all levels.

*Sub-Cortical Control of Movement:* It is now common to explain the method by which reflex activity is controlled by the existence of an internuncial pool interposed between the sensory and motor components of the reflex arc. When a stimulus is applied to a posterior root, its resultant reflex effect is conditioned by the existing level of electrical activity in this internuncial pool. This in turn is influenced by relays, which are either facilitatory or inhibitory, from the basal ganglia and brain stem reticular formation. It has been shown that the anterior portion of the reticular formation produced a facilitatory effect on the motor output, whereas the posterior por-

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tion exerted an inhibitory influence. This entire complex of relays has been frequently described as a servomechanism for control of motor activity.

The instantaneous level of electrical activity at those interneuron pools is also influenced by differences in the conduction velocity of their afferent fibers. Some sensory afferents are relayed by a direct and rapid route over the main sensory tracts through the thalamus to the cortex. A slower, more plastic route relays the afferents by way of the reticular formation through the thalamus to the cortex. Afferent stimuli from many different sources are thus modified, coordinated, and integrated as they pass through this system on the way to the cortex. Similarly, so-called motor relays to spinal internuncials are transmitted along paired sets of fast and slow conducting axons.

## Spastic Paresis

The peripheral manifestations of brain injury as seen in primates may be grouped under the heading of spasticity and paresis. Magoun[5] has defined spasticity as consisting of an exaggeration of spinal stretch reflexes, increased resistance to manipulation, and clonus. According to Magoun the hyperactive stretch reflex seen in spastic conditions is a result of injury to cell nuclei in the brain stem and in the premotor cortex. Since the reflex is exaggerated after injury to these regions, it is quite evident that the normal function of these structures on spinal reflexes is inhibitory. Such inhibitory centers have been found in the premotor cortex, the reticular formation, corpus striatum, in the basal ganglia and upper brain stem tegmentum, and in the anterior lobe of the cerebellum. Inhibitory relays from these centers are distributed through the extrapyramidal fiber groups. Injury to this system produces spasticity or exaggeration of spinal stretch reflexes. On the other hand facilitation of stretch reflexes follows stimulation of antagonistic centers in the cortex, brain stem, and cerebellum.

The production of spasticity therefore would seem to depend on a relative reduction in the amount of inhibitory relays at a time when facilitatory relays are being conducted without interruption.

*Distribution of Spastic Paresis:* The distribution of spasticity in hemiplegia is found in the postural muscles, namely in the flexors of the arm and the extensors of the leg. Paresis, however, is located in just the opposite groups, that is, in the extensors of the arms and the flexors of the legs. Twitchell[6] has shown that exaggerated reflex activity was seen in the flexor groups of the upper limb, the extensor groups of the lower limb, and the adductor groups of both limbs. Likewise, the return of voluntary control has been found to occur much earlier in these "postural" muscles than in their antagonists. This indicates that relays through spinal reflex centers must strongly favor earlier reflex return in the "postural" muscle groups.

Why should there be this differential rate of return? Why, after reduction in descending inhibitory relays, are proprioceptive afferent relays not fed in equal proportion to flexor and extensor motoneurons? The existence of such a bias system can perhaps best be explained by differences in fiber diameters and in their methods of relay around motoneurons.

Lloyd[7] has shown that the afferent fibers carrying postural reflexes had a larger diameter, conducted more rapidly, relayed more easily, and their aborizations around motor horn cells were more direct than those to the opposing groups. Sherrington's[3] hypothesis of selective synaptic resistance can also be used to describe the existence of competing "half centers" in the spinal cord, a dorsally-placed one innervating the flexor muscle groups and a more ventral one supplying the extensor muscles.

## Methods of Reducing Afferent Stimuli to the Postural Muscles

It is apparent from the preceding facts that the control of afferent influences, particularly those arising in proprioceptive end organs, should aid in the management of spastic paresis. Some means of exercising control on proprioceptive relays will now be discussed. This is a summary of the methods employed in a series of 125 patients with spastic hemiparesis.

*Restriction of Stance and Ambulation:* Standing and ambulation were encouraged until the extensor muscles were able to support the body weight. Subsequently, ambulation was strictly curtailed until patients were able to perform 90 degree knee flexion in the standing position without any concomitant hip flexion. Since standing also was seen to facilitate postural hypertonus in the arm, and to be detrimental to the reeducation of the recalcitrant extensor muscles, we considered this to be a further reason for restriction of ambulation.

*Selective Reeducation:* All efforts were directed to reeducation of the flexors of the leg and the extensors of the arm. In the leg, re-training was directed specifically to the flexors of the knee, dorsiflexors and evertors of the foot, and the internal rotators of the hip. In the arm, exercises were aimed at the extensors of the elbow, dorsiflexors of the wrist, extensors of the fingers and thumb, supinators of the forearm, and external rotators of the shoulder. It needs to be emphasized that the antagonists were almost totally ignored.

*Occupational Therapy and Activities of Daily Living:* Occupational therapy likewise was curtailed early in recovery because it appeared that the application of moving contactual stimuli to the palm produced further increment in flexion of the elbow, wrist, and hand. This observation was in keeping with Twitchell's[6] original reports on the results of contactual stimulation. When occupational therapy was used, it was restricted to re-training of gross movements in the hemiplegic arm. Similarly, activities of daily living were severely limited because they too seemed to encourage undesirable postural preponderance. Such activities were instituted only when it was apparent that the program of selective re-training had failed, and when no further progression in volitional recovery could be anticipated.

*Nerve Blocks:* The use of 1 per cent xylocaine to block hyperactive muscles offered an easy method to assay the potential for recovery of the hypoactive paretic muscle groups. This technic has been reported by Pearson.[8] Following such blocks, the prospects that surgical de-afferentation might offer were discussed with the patient, and the details of the problem were presented to the surgeons.

*Proprioceptive De-afferentation:* If a worthwhile increment in voluntary function of the hypoactive groups followed chemical blocking of the nerves to the hyperactive antagonists, consideration was given to the possible benefits of a more prolonged interruption of conduction. Our aims in the use of surgical interruption were to reduce the absolute amount of afferent reflux from postural muscle groups and to aid in the re-training and strengthening of the paretic antagonists.

Only standard and well-tested operative procedures were attempted. De-afferentation by nerve conduction block was preferred to tendon lengthening or tenotomy because it was felt that nerve interruptions offered a more easily graded method for reduction of hyperactivity than did operations on end organs. Although the actual surgical attack was on motor branches to the hyperactive muscle groups, our chief interest lay in the interruption of proprioceptive return from these muscles. Since the axons conveying both motor and proprioceptive relays are of approximately the same character, it seemed justifiable to refer to this method as selective proprioceptive de-afferentation.

## Discussion

This presentation is offered mainly to direct attention away from the afferent assets and liabilities of spastic hemiplegia, and towards the efferent influx from proprioceptors. It is inherent in all the more recent methods of re-education, particularly those advocated by Fay, Phelps, and Perlstein who state that the most effective methods of influencing return are by "proprioceptive stimulation." In this report, we have attempted to point out the dangers of uncontrolled proprioceptive stimulation, such as may arise from uncontrolled ambulation, poorly timed occupational therapy, and indiscriminate re-education of both agonist and antagonist. Further means of con-

trolling afferent return by nerve interruptions are proposed mainly because these were found to be useful in speeding motor recovery. The primary purpose of this paper is to direct the attention of our physiatric colleagues to fairly recent deemphasis in the neurophysiological literature of the primacy of the motor cortex and its relays in the control of voluntary movement.

### Conclusions

The importance of sensory relays and the sensorimotor cortex has been stressed. The influence of incoming afferent signals on hypersensitive spinal centers has been discussed. Conservative and surgical methods in influencing proprioceptive afferent return have been presented.

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## NORTHWEST SECTION MEETS HALFWAY

The Northwest Section of the American Congress of Physical Medicine and Rehabilitation met halfway between Seattle and Portland, at the Lewis-Clark Hotel, Centralia, Wash., on Saturday, April 14, 1956, for a business meeting, presentation of scientific papers, discussion, and a banquet.

Any member of the American Congress of Physical Medicine and Rehabilitation wishing to submit the name of an individual for consideration by the Gold Key Award Committee, may do so by sending such information to the Committee Chairman, Donald L. Rose, M.D., Dir., Dept. of Physical Medicine, University of Kansas Medical Center, Kansas City 3, Kansas.

Any nomination must be substantiated by the sponsor's opinion as to why this high award should be conferred on the individual so named.

# Some Psychological Problems of Patients With Multiple Sclerosis

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While at least one author has concluded that the patient with multiple sclerosis presents no definite personality type,[1] some clinical observations suggest strongly, without necessarily ascribing any causal significance to the suggestion, that emotional factors play a significant role in this disease.[2-5] It has further been shown that some psychological test patterns are more or less characteristic of groups of patients with multiple sclerosis and that certain of these characteristics differ significantly from those evidenced by patients with other chronic physical diseases.[6]

I am inclined to accept the hypothesis that these characteristics, which tests reveal to be a kind of pervasive body-anxiety, are caused largely by the ambiguity of the disease process itself and the resultant uncertainty of the patient with respect to his own probable future status. Clinical psychological evaluations of individual patients in the advanced stages of this disease frequently reveal the extent of the effects of this uncertainty and the resultant mechanisms adopted by the patient in his efforts to restructure his introspections into a meaningful and coherent conception of himself. Although individual adaptive technics may vary widely, especially in the initial phases of the disease, the threatening depression, the self-awareness and concern, and the inability of the patient to make sometimes even simple decisions about himself always seem to underlie the specific mechanisms of defense that are finally employed.

It is not surprising, then, to find that frequently the social activities of patients with multiple sclerosis reflect the influence of some basic insecurities. Normally stable relationships cannot be supported by these individuals, since they often find that they can no longer provide others with expected satisfactions. Their social failures range from apparently superficial lapses of memory in ordinary conversation to more basic and intimate insufficiencies such as those that center about the loss or reduction of sexual capacity. They cannot overcome their disorder, and they cannot be sure that it will not become worse.

## Group Studies

From the scientific point of view, much is to be gained from the study of the psychological processes that take place in artificially constructed groups composed exclusively of patients with multiple sclerosis. The group situation brings together many individuals with the same physical disease and provides the observer with some excellent opportunities to view not only the ways in which the common anxieties of these patients become apparent but also the different technics each individual chooses to use as defenses against these fears. Especially valuable in this regard are the "unstructured" group organizations, in which no outside leadership is provided except when this becomes absolutely necessary to stop serious arguments or to prevent the arousal of unmanageable anxiety. When this type of situation is set into relief by also providing alternate, well-structured, activity or game sessions, organized and led by a member of the hospital staff, the combination is most effective and the results even more impressively apparent.

In this type of controlled, alternating situation, the strong needs of every severely involved multiple sclerosis patient for structure and organization become

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only too readily evident. Initially, the patients form into small cliques of two or three persons, carried over from the wards, or else they isolate themselves completely from the others present. Later, although they slowly learn to recognize the group as a unit and to recognize its potential effectiveness, they still cannot act with unity, and their best intentions fail to come to fruition because they cannot "pull together" toward a common end. They undertake to find a leader, but there are no leaders in the group, for each individual is as uncertain and troubled as the next. They look to the hospital staff member for help and he tells them only, "This is your group. I am not here to direct you. You may do entirely as you like." They become hostile toward the hospital, toward themselves, toward society, and toward each other. The frequency of pessimistic, disease-centered conversation increases. They become more and more concerned with an increasingly morbid tendency to compare symptoms. Finally, they are able to think and speak about nothing but the misfortunes of multiple sclerosis.

The group then takes on a unity, but it is not the unity of people striving to improve their lot. It is rather the unity of shared disappointment. Before the observer's eyes an exclusive "MS society" is formed that represents the "least liked," "most neglected," "most hopeless" group of people in the world.

This is not to say that every patient with multiple sclerosis shows precisely the same reactions to the situation. Many simply cease appearing at the group sessions entirely. They recognize their dissatisfaction with the constant arousal of their anxieties and the unnecessary discomfort that the unfortunate process has produced. But the "hard core" of the discouraged remains, and these individuals soon set the tempo and atmosphere that prevails.

Such has been my experience, not only in formal research set-ups, but in observations of multiple sclerosis patients during their daily institutional lives. Those patients who succeed best in adapting to their limitations are those with the inner strength to resist the pressure of the less well adjusted. Those who become the best patients are those who are capable of functioning as individuals despite the temptation to regress. Sometimes this involves a realistic perception of the situation, and sometimes it forces the patient into an unreal world where symptoms are denied and personal identity is distorted; but in either case, when defenses are effective, the "successful" patient somehow avoids his intolerance of uncertainty and thus achieves a measure of inner satisfaction within himself.

### Institutional Management

Assuming that these observations are correct and that the previously mentioned explanatory hypothesis possesses at least the merit of a first approximation, what then are the implications for the institutional management of patients with this disease?

In the interest of the patient's subjective comfort, it seems desirable first to promote as strong an *independent-self* as possible, through the provision of work and activities the patient can perform, in occupations that yield as much a sense of being a person-among-persons as can be arranged. This implies the patient's participation in individualized programs of physical and occupational therapy, even though these may not appear to the physician to be producing any immediate physical progress. The patient who is severely involved with multiple sclerosis is often extremely sensitive to any suggestion that he is being abandoned, rejected, or granted fewer opportunities than others.

Next, it seems most important that patients with multiple sclerosis be housed and grouped with individuals whose own physical conditions are basically stable in character: amputees, paraplegics, controlled diabetics, almost anyone other than someone else with multiple sclerosis.

Finally, it seems desirable that the lives of patients with multiple sclerosis be given as much structure and certainty as possible through the use of regular, unchanging schedules, strictly adhered to, and secure routines that may be depended upon.

## Conclusions

In the building and maintenance of an independent self, however unrealistic, the patient with multiple sclerosis will find his most effective barrier to pessimism and despair. He should not be deprived of his privilege to possess even a moderately delusional self-defense unless those who seek to help him are also willing to assume the responsibility for the long and tedious process of extended, professionally administered psychotherapy.

In the day-to-day association with people whose physical states are stable, the patient with multiple sclerosis will find support for his internal processes of adjusting to a personally ambiguous state. In the certainty that each day's activities will be like the one before, and in the knowledge that changes will occur only after a suitable period of preparation by trusted people, he may temporarily relax and reorganize his thoughts.

Finally, in a situation where the "hard core" of pessimism, dysphoria, and morbidity is not allowed to form, he may find himself with energy left over for turning to other things. Less plagued by doubt, more certain of his present and future state, less in contact with those who have succumbed to the very fears he feels himself, he should slowly have a better chance to feel more secure and perhaps a little more comfortable in his unfortunate physical state.

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**MIDWESTERN SECTION**

**American Congress of Physical Medicine and Rehabilitation**

**ONE-DAY CLINICAL AND SCIENTIFIC PROGRAM**

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*Place:* Veterans Administration Hospital
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*Date:* May 4, 1956

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# Current Trends in Physical Medicine and Rehabilitation

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It has been previously pointed out that a fundamental need exists for more education of physicians for the specialty training in the field of Physical Medicine and Rehabilitation, as well as a need for training of technical personnel.[1, 2] The accomplishments in the last five years in this field have included a considerable expansion in the number of technical personnel trained, particularly physical therapists who have received financial aid in the form of scholarships, largely from the National Foundation for Infantile Paralysis. There has also been expansion in the facilities for rendering services for rehabilitation throughout the various states. This has been augmented by the federal government through its program in the Office of Vocational Rehabilitation. Of special interest to the medical profession is how this need for increased rehabilitation services has been met by the different medical specialties.

## Developments In Medical Education

In response to the surveys of the Baruch Committee on Physical Medicine and Rehabilitation, which pointed out the need, fellowships for training doctors in the specialty have been granted by the Baruch Committee and the National Foundation for Infantile Paralysis, more recently by the Public Health Service, and most recently by the Office of Vocational Rehabilitation of the U. S. Department of Health, Education and Welfare. Consequently, opportunities for training doctors in this field have increased adequately. In spite of the inducement of fellowships, at the present time unfilled residencies still remain, as is also true of many of the other specialties. As a result of this expanding educational program, more than 250 certified specialists have been trained in the field, but still the demands have not been met. Although the number of young men who have been interested in training in this field has not reached sufficient numbers to fill the vacancies, the coincident publicity to interest young doctors has aroused the interest of some other specialties that are more crowded and competitive than the new specialty of physical medicine and rehabilitation. This has led to some dilemma in the minds of many physicians. For this reason, it seems worthwhile to consider why there should be a group of doctors specializing in this aspect of medical care and to find what this specialization amounts to.

## Clinical Practice of Physical Medicine and Rehabilitation

Rehabilitation is such a loosely used term that covers so many aspects of care of the patient that any or all of the medical specialties can truthfully say that they are interested in the rehabilitation of their patients. This is of course as it should be, although more interest by the general practitioner would be welcome. Examples of this interest are easily drawn from among the surgical specialties. For instance, the plastic surgeon is deeply interested in rehabilitation because his services are necessary in the critically burned patient and in correction of congenital deformities and other deformities resulting from disease or injury. The chest surgeon who improves cardiac function and removes tumors and infectious lesions of the lungs certainly has a claim to the term rehabilitation. The same is true of any general surgeon who cures a patient with a tumor or chronic infection, or who remedies a condition such as ulcerative colitis. A particular interest in rehabilitation should reside in

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those performing surgery because of peripheral vascular disease, particularly amputations; however, all too many surgeons fail to follow through in the rehabilitation of the amputee.

Among the surgical specialties the orthopedic surgeons are undoubtedly most closely and directly connected with what is commonly accepted as rehabilitation, because of their interest in bones, joints, and neuromuscular function in general. Their interest covers a broad variety of disabilities requiring orthopedic rehabilitative treatment. They have also long felt the need of paramedical services such as physical and occupational therapy in the aftercare of fractures and reconstructive orthopedic surgical procedures. Because of the necessity of operations in the care of patients with infantile paralysis, orthopedic surgeons have assumed the leading role in the care of patients with this disease even though, for the majority of patients, orthopedic surgery is never needed. The same is true of patients with cerebral palsy who have disabilities of function, although the treatment is largely nonsurgical in nature. The patient with traumatic paraplegia, because of injury to or disease of the spinal cord, often is cared for by an orthopedic surgeon, although the only surgery performed upon the patient may be plastic surgery, urological surgery, or neurosurgery and the major care strictly medical in nature.

The neurologists have a great many patients with chronic disease; such as multiple sclerosis, who require many of the services defined as rehabilitation. The internist interested in the rheumatic diseases, particularly rheumatoid arthritis, can hardly practice his specialty without the close cooperation of physical therapists and the utilization of the technics commonly known as physical medicine. The cardiac patient during his rehabilitation will also require the services of paramedical specialties of physical medicine. Physicians particularly interested in pulmonary disease, such as tuberculosis, for many years have been concerned with the rehabilitation of their patient and have used ancillary professional groups, particularly occupational therapists, social workers, and vocational counselors. These are but a few examples of how all doctors of medicine have an interest in rehabilitation. A question of considerable interest remains: What is the close relationship between physical medicine and rehabilitation?

## Specialty Training In Physical Medicine and Rehabilitation

The physiatrist, that is, the specialist trained in physical medicine and rehabilitation and certified by the specialty board, has received a specialty training and education similar in length to that of the other specialists previously mentioned. For example, he was graduated from an approved medical school, has had at least one year of rotating internship, and has had three years of approved residency training to make him eligible to take the Part I examination as well as two additional years for Part II. Because of the board requirements of the specialist in this field, it is acceptable to the board that some of his residency training be in the allied specialties such as internal medicine, orthopedics, and neurology, as well as in the basic sciences. Indeed such training is recommended. As our knowledge of training doctors in this specialty increases with experience, it is more and more frequently advocated that the training include more time in the allied specialties so that a proper broad background of medical education may be obtained.

The training that is more exclusive to the field deals with the understanding of applied biophysics as related to medical practice. This involves detailed study of the effects of physical agents such as heat, light, and electrical energy; the effects of mechanical forces including massage, hydrotherapy, exercise, and ultrasound, and the use of specialized mechanical aids useful in clinical practice such as, prostheses, splints, and other adaptive devices.

As the special knowledge of the physiatrist deals with the application of these physical aids for therapeutic purposes, the application of the physical agents in medical practice leads him,

naturally, to treat patients with the type of disability that requires a more-or-less prolonged period of rehabilitative treatment. For practical purposes a period of treatment, which we call rehabilitation, frequently is accomplished in a special area for the sole purpose of rehabilitation. These institutions are often separated physically, although not necessarily so, into rehabilitation centers. Paramedical specialists involved in the rehabilitative process include physical therapists, occupational therapists, special exercise therapists (such as corrective therapists), and, in some instances, manual arts therapists, clinical psychologists, recreational therapists, and speech therapists. Other important personnel of the rehabilitation center are the social service workers, the vocational counselors, and the employment placement agencies.

### Rehabilitation as a Specialty

Since medical rehabilitation is a complicated process that requires proper medical supervision, leadership is needed from a physician whose only acclaimed specialty interest is in this type of work. Without such medical direction and supervision the lay therapist is left no alternative but to practice medicine. All too often the physical therapist is called upon to prescribe the type of physical agent to be used for treatment, its duration and intensity, and when it should be changed. Similarly, the occupational therapist is often given the minimum of instructions as to how to proceed. Except for vocational rehabilitation it should be apparent that medical rehabilitation is, in essence, the practice of medicine and should be very closely directed and supervised by a doctor. For this reason, if for no other, it is imperative that there be enough specialists in this field with the knowledge of how to direct properly the lay personnel connected with the activities in a rehabilitation center to provide proper direction for the benefit of the patient.

It is undoubtedly true that many of the medical and surgical specialists could very well supervise their own patients in a rehabilitation center if they were there to do so. It appears, however, that at present only one specialty trains its doctors in the wide scope of medical rehabilitation to handle this important medical supervision. Although the dermatologist could prescribe the ultraviolet radiation for the patient with skin disease, the internist could indicate the proper treatment for the arthritic patient, the orthopedist could prescribe the proper care for his arthroplasty patient, and the neurologist could indicate proper procedures in speech therapy and other problems of the neurological patient, each of these specialists would have difficulty in properly directing the medical care for patients whose disabilities fall within the realm of the other specialists, and would not have the interest to supervise them continuously.

The physiatrist is uniquely trained with a wide background of experience in prescribing and directing the care of patients receiving treatment in a rehabilitation center. To great advantage is the fact that his interests are primarily those of directing the patient in this phase of therapy and not in surgical technics or the studies of pathologic physiology of a special tissue or organ. Because of this broad interest derived from a broad training, he is called upon to provide leadership for the patient during the rehabilitation process. The term rehabilitation, accordingly, has been added to designate the broad interests of specialists in the field of physical medicine.

### Research

A fundamental "must" for the survival of any specialty and for its necessary growth is an interest in basic and clinical research in its own field. In physical medicine there has been a wealth of opportunities for such studies. Basic research has brought forth contributions dealing with the effects of physical agents on biological systems and in treating patients with a variety of pathological conditions.

Two examples of a combination of basic and clinical research that have resulted in new knowledge of physical agents found to be of value to the medical profession may be cited. First, is mircowave diathermy. This very high

frequency, very short wave-length electrical energy was thoroughly tested in the laboratories. Later, clinical studies were done in departments of physical medicine of hospitals and offices, with the result that a new, safe, effective heating agent has been made available to the medical profession.

More recently ultrasound, which is a mechanical vibrating energy of frequency greater than sound, has also been studied for its fundamental effect on living tissue and on patients. Final statements are not yet available, but all preliminary studies show that ultrasound can be used as a very effective method for producing fairly deep heating. It is powerful enough to cause damage when improperly used and, consequently, had best be employed by physicians familiar with its biophysical effects. The clinical reports to date have included overenthusiastic claims, but enough evidence has been collected to include ultrasound as a valuable physical therapeutic procedure.

We have, then, two current contributions of the specialty of physical medicine made available for practitioners of medicine, particularly in problems of rehabilitation.

### Summary and Conclusions

Physical medicine is a well-defined specialty dealing with applied biophysics in medicine. In applications of physical medicine, physiatrists are concerned with the rehabilitation of a wide variety of conditions and disabilities cutting across most of the established medical and surgical specialties. Medical rehabilitation is a complicated process starting with the doctor's care of his patient, but including at present the services of many paramedical technicians who need direct and continuing medical supervision. The physiatrist through his broad training, including his education in most of the other specialties, and with his primary interest, that of medical supervision of rehabilitation procedures, is uniquely trained to assume leadership in the practice of physical medicine and medical rehabilitation. Research exclusive to the field has recently indicated that microwave diathermy is a new and valuable physical therapeutic procedure and that one of the newer physical agents, ultrasound, is also an important and powerful form of energy that has some valuable therapeutic effects.

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## SUCCESS IS THE KEYNOTE

**of our meeting this year! An interesting and scientific exhibit will contribute much to our success. In addition to the tremendous value of these exhibits, *you* have the opportunity to be considered for one of the coveted awards. Requests for applications for scientific exhibit space in connection with the 34th annual session scheduled for September 9-14, 1956, The Ambassador, Atlantic City, N. J., are now being received. Address all communications to the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, Illinois.**

# Editorial

## The Rehabilitation Team

The following is a letter from a social worker to the Director of a State Department of Public Welfare concerning the rehabilitation of a middle aged hemiplegic woman.

"I want to briefly summarize this case as I think it illustrates government in action and how direct and personal can be the relationship of government, particularly welfare services, to people. In the following case there appear to be four aspects worthy of comment. The first is the increase in personal satisfaction with life that took place. The second, is a saving in public funds. Third, is the great value of our medical consultant, Dr. _____. Fourth, is the contribution which the _____ Hospital's Rehabilitation Center is making."

"Mrs. H_____ was referred to this department as an Aid-to-Disabled case on March 10, 1955. By November 1, she was no longer in need and there is prospect that she will not need any further assistance. At the time she was referred she had been disabled for two years with a right-sided paralysis resulting from a stroke. There was a need for assistance because she spent all of her time in a wheelchair. She was unable to dress or undress herself and was even unable to feed herself. She was very depressed in her mental attitude."

"When we reviewed the case with our medical consultant he suggested that eligibility be limited to one year and that the lady be referred to a rehabilitation center because of her comparatively young age and, of course, because of the prospect for rehabilitation. On our suggestion the County Welfare Board did send the lady to the _____ Hospital with a specific referral to the rehabilitation center. The hospital said that at first she made very slow progress because of her mental depression. However, they were able to motivate her and when she left the hospital she was able to stand, and to walk with a cane and a short leg brace. She was self-sufficient in her home. In fact, she was able to manage almost everything in the home. They report, 'Her family was exceedingly pleased with her recovery and we feel will help her to remain independent.' Her husband said he was 'going to hang the wheelchair in the top of the garage.' The fact that this lady changed from what certainly was a downhill course with depression being an important factor in the picture, and the prospect for the family of unhappiness until the woman finally died plus an increase in the cost of care as she gradually went downhill is something that cannot be over-emphasized. If the only accomplishment were a change to a more hopeful outlook we could have looked with pride on this case, but we have even greater results. The results are so substantial that the husband can now support his wife without outside aid because she can do her own work and is interested in her home."

"We have no way to measure exactly how much of a saving of public funds might be involved but in all probability with the depression and the attendant inability to care for herself, this lady would have soon become a bed patient and before she died would have cost the public thousands of dollars."

"Of course, our medical consultant must be given credit because of his ability to evaluate situations and his knowledge of what might reasonably be expected on the basis of the medical evidence presented. We cannot overlook the contributions made by the skill and ingenuity of the _____ Hospital's Rehabilitation Center. Certainly we should not overlook, either, the interest of the County Welfare Board in making the services of the _____ Hospital available to this lady. The husband's statement that he was going to hang the wheelchair in the top of the garage illustrates how deeply he must have felt his wife's former inability to manage her own and household affairs."

This letter not only indicates the ramifications of the interest in rehabilitation of one individual but it also expresses very well the philosophy of and the goals to be achieved by rehabilitation. Teamwork by well trained professional personnel is necessary to achieve success as efficiently as possible. For this one patient the team included the family physician, the medical consultant, the medical staff at the Rehabilitation Center, physical therapists, occupational therapists, nurses, the social worker, the vocational counselor, the clinical psychologist, the County Welfare Board, and the State Department of Welfare. All members of the team worked together to accomplish the final rehabilitation of this woman. Successful rehabilitation of patients like this one require the training of all members of the rehabilitation team in the philosophy and the technics of the rehabilitation program.

# Physical Medicine Abstracts

**Evaluation of Current Therapy in Cerebral Vascular Disease. J. F. Fazekas; J. Kleh, and R. W. Alman.** J. Chron. Dis. **2**:508 (Nov.) 1955.

The clinical effectiveness of vasodilators, stimulants, anticoagulants, hypotensive agents, and rehabilitative procedures in patients with cerebral vascular disturbances are reviewed and evaluated. Available vasodilators relax cerebral vessels, but only in conjunction with reduction of pressure, and they do not augment total cerebral blood flow. Drugs that merely increase cerebral blood flow are not likely to be of value in chronic disease since brain damage develops rapidly after ischemia. Present physiologic and clinical evidence is insufficient to indicate that cerebral stimulants are effective in the treatment of patients with cortical dysfunction and generalized cerebral vascular disease. Hypotensive agents may be used in spite of overt manifestations of cerebral vascular disease; however, blood pressure should be reduced gradually and maintained above normotensive levels. Anticoagulants reduce the incidence of cerebral emboli in patients with rheumatic heart disease and myocardial infarction. They also reduce the number of recurrent attacks from threatened occlusion of basilar and carotid arteries. Their use in patients with cerebral thrombosis does not seem justified, however, and experience with their use in cerebral thrombosis is limited.

Rehabilitation seems to be the most effective of all the present methods of treatment for patients with cerebral vascular disorders; however, most rehabilitation programs are incomplete or too expensive for the majority of patients. Proper evaluation of a patient's problem requires the cooperation of a team of specialists. Direction of the individualized rehabilitation program should be under the supervision of a physiatrist.

**The Practicing Physician's Role in the Control of Poliomyelitis. Leonard Schuman.** Illinois M. J. **108**:218 (Oct.) 1955.

A plea is made to the medical profession not to let optimism concerning the use of the Salk vaccine overrule objectivity in contemplating the control of poliomyelitis within the next several years. Nonparalytic cases may

still occur, and 10 to 30 per cent of those inoculated may still develop the paralytic form.

The reporting system for this disease must be continued, with meticulous attention to diagnosis by all available means. Poliomyelitis must be kept in mind in making differential diagnosis during the decline of its incidence. Health department records will be important in the next few years for several reasons: 1) variability of antigenicity of certain batches of vaccine; 2) variants of the three basic prototypes of the poliomyelitis virus may arise through cellular evolution or mutation and cause the disease in inoculated individuals; 3) to determine the total percentage of the child population which will have to be inoculated in order to suppress the incidence of poliomyelitis to a low residual level.

Surveillance programs for poliomyelitis should be established now, as they have been for all diseases of low prevalence, so as to continue the evaluation of epidemiological investigation.

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**Whiplash Injuries. E. G. Lipow.** South M. J. **48**:1304 (Dec.) 1955.

Seventy-eight per cent of 50 cases of whiplash injury were due to collision of automobile from the rear; 14 per cent occurred with sudden stopping or deceleration.

Since most of the neck muscles originate or insert into or close to the occiput, occipital headaches commonly occur following this injury. Pain due to cervical root irritation may occur in the C3, 4, 5, 6 or 7 segments. The pathologic findings include hemorrhage in the soft tissues of the neck and around nerve trunks with healing by granulation tissue and formation of adhesions; partial avulsion and rupture of muscles and tendons of the neck with incomplete healing or shortening with healing; cervical radiculitis due chiefly to injury and edema; avulsion fractures of spinous processes; fractures of articular facets; dislocations of vertebrae; protrusion of nucleus pulposus. This paper includes only those cases in which x-ray of the cervical spine was negative.

The symptoms and course are influenced by the extent of brain damage, associated injuries in other body parts, and pre-existing disease in the cervical spine. Neck pain and stiffness, areas of tenderness, and trigger points appear soon after injury along with a more or less constant occipital headache which may radiate toward the frontal region and the eye. The pain may spread down the lateral aspect of the neck to one or both shoulders, elbows and hands. Cervical spine and shoulder motions become limited. Paresthesias often occur. Chest and costosternal junction pain and dysphagia are sometimes present. Apprehension and neuroses occur with progression of symptoms. The unusually long recovery period required for a rather mild accident, is out of all proportion to objective findings and is outstanding in this syndrome.

Treatment in this series consisted of heat, some form of cervical traction, muscle relaxants of the mephenesin group, analgesics in early phases. Repository tubocurarine was employed intramuscularly in bed patients with severe spasm. Procaine injections were used in 26 cases (52 per cent). Paravertebral cervical blocks were done in some cases. Only two patients required psychiatric consultations. In 6 cases (12 per cent) it was felt that the psychoneurosis was unimproved after maximum benefits otherwise had been obtained.

The time lost from work averaged 14.8 days. The time required for recovery was directly related to rapidity with which treatment was started. The sooner treatment was started, the shorter the recovery period. The number of treatments varied directly with the severity and extent of injury. Eighty-four per cent of the cases started treatment within 24 hours of injury, and 88 per cent were either completely relieved or improved (only transitory headache or stiffness remained and there was no loss of work or residual disability). Compensation and litigation procedures definitely affect the outcome of these cases.

Severe psychoneuroses, degenerated discs, unhealed fractures, segmental chronic radiculitis and other residuals can result when early and proper treatment is not instituted.

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**Mechanisms of Skeletal Muscle Pain and Fatigue. T. L. Dorpat, and T. H. Holmes.** A. M. A. Arch. Neurol. & Psychiat. **74(6)**:628 (Dec.) 1955.

In studies on contracting muscles of the forearm, the authors found that pain and tenderness produced during sustained and intermittent muscular contractions with the circulation intact are identical, qualitatively, with ischemic muscular pain. The intensity and rate of onset of such pain are directly proportional to the strength of contraction, and with a strong and sustained contraction the pain is of similar magnitude whether the circulation is intact or occluded. Using blood flow experiments they found that during the contraction of a muscle, the mechanical occlusion of blood vessels produces an ischemia, which is approximately proportioned to the strength of the contraction. A strongly contracting muscle is almost completely ischemic. Increased blood flow follows strong contractions and occurs during the rest pauses in rhythmic exercises.

The factor producing muscle pain (factor P of Lewis) is still in doubt, but recent studies have suggested that either it is muscle potassium or potassium is one of its important components. The concentration of factor P depends on the strength and duration of the contraction and on the rate of blood flow.

From these studies it is evident that sustained muscular tension (often seen in cases with low back pain), which produces ischemia, can evoke pain in the absence of pathology of either the blood vessels or the muscles.

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**Studies on the Sacral Reflex Arc in Paraplegia. V. Surgical Therapy of Autonomic Hyperreflexia in Cervical and Upper Thoracic Myelopathy. C. D. Scheibert.** J. Neurol., Neurosurg. & Psychiat. **XII**:468 (Sept.) 1955.

Pathologic reflex mechanisms peculiar to the spinal cord often deter the rehabilitation of paraplegics. One of these is autonomic hyperreflexia with its dangerous paroxysmal hypertension. Clinically significant mass autonomic reflexes may be seen in myelopathies above the 6th thoracic neurotone. The symptoms are severe throbbing headache, sweating, and cutis anserina, usually above the level of the myelopathy, and occasionally dyspnea, palpitation and nasal congestion.

Headache and hypertension occur in these patients as a result of filling of the bladder as occurs in doing a cystometrogram. Filling the bladder was used as the stimulus in the study of 13 patients, pre- and post-operatively. All of these patients had extremely severe hypertension and headache or sweating in response to bladder irrigation or catheterization, routine enemas and bathing of the perineum. Pre- and post-operative studies by means of plethysmographic tracings from the thumb, little finger, and great toe, blood pressure, pulse, skin resistance and temperature recordings from several different areas of the skin from head to toe were made. In the first few cases sacral or saddle block followed by the same studies was used to predict the post-operative result.

Surgery should be considered only when adequate medical therapy fails. This consists of improvement in general nutrition and health, elimination of the use of a catheter for urinary drainage, if possible, correction of urinary tract infection and removal of bladder calculi, use of topical anesthetic agents before urethral, anal or bladder manipulation and the judicious use of hexamethonium.

Seven patients underwent 1st or 2nd through the 5th sacral rhizotomy or neurotomy performed through upper sacral laminectomy. Four patients had total lumbosacral rhizotomy with excision of the conus medullaris for concomitant relief of spasticity of the lower extremities. Posterior rhizotomy below T-9 was done in one case with thoracic chordectomy in the remaining patient.

Eleven patients enjoyed complete relief and two almost complete relief from autonomic hyperreflexia. The simplest surgical treatment which gave relief was the division of the sacral nerves or roots bilaterally through upper sacral laminectomy, the sacral nerves being cut after leaving the dural sac.

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**Amyoplasia Congenita. Report of a Case. L. H. Golden, and G. D. Weickhardt.** U. S. Armed Forces M. J. **VI**:1512 (Oct.) 1955.

Amyoplasia congenita is described as a rare multiple developmental articular rigidity which produces fixation of joints similar to that seen in fibrous ankylosis, but with no evidence of inflammation. Hips, knees, elbows, thumbs may be subluxed; short neck, torticollis, kyphosis, scoliosis, digit webbing, polydactylia, hernia, genital deformities, and hydrocephalus have all been reported.

The patient is a 24-year old officer whose clinical picture was characterized by curvature of the fingers since early childhood, atrophy of interosseous muscles of the hands, absence of sensory disturbances, negative family history. The recent onset of atrophy of thenar muscles suggested progression but otherwise the condition was thought to be benign. Partial flexion of all interphalangeal joints was noted and complete extension was not possible, these changes being present since childhood.

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**A New Technique for the Local Use of Hydrocortisone in Rheumatic Disease. A. W. Bagnall.** Canad. M. A. J. **73(12)**:972 (Dec. 15) 1955.

Although the local injection of hydrocortisone is usually an effective treatment for localized rheumatic pain, there has been an unexpectedly high incidence of poor results. The author attributes this to errors in technic and suggests the use of an "indicator" to insure that the hydrocortisone is brought in contact with the inflamed tissue. He uses a mixture of hydrocortisone and a procaine "indicator." The 1 per cent procaine accomplishes temporarily the more lasting results to be hoped for with the hydrocortisone. If tenderness or pain remain after the injection, the hydrocortisone has not been injected into the proper location.

The importance of determining the exact site of pain is stressed because in certain joints, such as the shoulder, elbow, wrist, ankle and occasionally the knee, the lesion responsible for the pain is not in the joint, and therefore an intra-articular injection would not be helpful. Painful reactions in an infiltrated area are slightly more frequent when the procaine mixture rather than the pure hydrocortisone is injected. However, this occurrence does not lessen the proportion of good results.

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**Sciatic Syndrome Due to Endometriosis of Sciatic Nerve. R. O. Denton, and J. D. Sherrill.** South. M. J. **48**:1027 (Oct.) 1955.

The lesions associated with sciatic pain are presented in table form, with the four main types being those conditions causing intraspinal pressure or irritation; pressure or irritation at the intervertebral foramen; pressure or irritation in the course of the nerve, and

affectation of the nerve. Mention is made of the piriformis syndrome and the fact that in 10 per cent of a large number of cadavers the sciatic nerve passes through the muscle.

The case reported is that of a 42-year old white female with a 3-year history of recurrent right sciatica, the pain being constant for the past several months. There was a definite relationship of pain or its aggravation to the menstrual periods. On examination there was moderate tenderness to deep palpation in the region of the right sciatic notch. There was voluntary limitation of internal rotation and adduction of the right hip. Straight leg raising and the Laseque signs were positive on the right. There was slight atrophy of the right quadriceps. There was hypalgesia along the distribution of the right S-1 segment, and a diminished right ankle jerk. The spinal fluid was normal. Despite air myelograms revealing bulging of the disc at the L4-5 interspace, exploration of the right sciatic nerve was done. A brown soft friable tumor 1″x2″ involving the sciatic nerve as it made its exit beneath the piriformis muscle was found and excised. The lesion was microscopically endometriosis. This condition invading a peripheral nerve has not been reported previously.

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**Cooperation for Rehabilitation. J. L. Rudd.** Am. Pract. & Digest Treat. 7:63 (Jan.) 1956.

The author points out the necessity for cooperation among the general practitioner, physical medicine and rehabilitation service, and other specialists, with special reference to the treatment of arthritic patients, the amputee, the psychoneurotic and the tuberculous patients. It is his belief, that an increase in interest, knowledge, respect, as well as in the number of referrals to each service, resulted when clinics involving the aforementioned groups of patients were held jointly. Examples of the operation of combined clinics are discussed. Not only are the advantages of such combined clinics presented but also the possible dangers.

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**Amyloid Polyneuropathy. John F. Sullivan, et al.** Neurology 5:847 (Dec.) 1955.

Three cases of amyloid polyneuropathy were reported. A clinical diagnosis of this condition may be made, but verification by biopsy may be difficult. Repeated biopsies and re-examination of pathological material may be necessary to verify the diagnosis.

Each of the cases presented had chronic sensorimotor neuropathy, hoarseness, and electrocardiographic changes. A combination of these findings suggests primary amyloidosis.

Primary amyloidosis is a disease of mesenchymal tissue, whereas secondary amyloidosis affects parenchymatous organs. The heart and larynx are most frequently involved. The disease occurs most frequently in later life, having its onset in the fifth decade or later. A familial type occurring earlier has been reported. Males are affected three times as frequently as females.

In the cases presented the neuropathy always began in the lower extremities. Pain in the soles of the feet or in the calves was an early symptom. Early the neuropathy is asymmetrical. Later there is symmetrical involvement of both upper and lower extremities. Weakness and atrophy and the sensory deficit were most marked distally. Death of two of the patients resulted from congestive heart failure.

The larynx in primary amyloidosis may have a "definite yellowish color." It may be involved by deposition of amyloid as a local tumor or distributed diffusely throughout the larynx.

The ECG changes are nonspecific, such as low QRS complexes, T-wave changes, auricular fibrillation, conduction defects, right or left axis deviation.

Some feel that the neuropathy is due to ischemic degeneration of the nerves. Others feel there is an inflammatory pathogenesis. The authors suggest additional toxic or metabolic factors in operation.

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**The Role of Physical Medicine and Rehabilitation in Chronic Medical Diseases. Louis B. Newman.** Am. Pract. & Digest Treat. 7:47 (Jan.) 1956.

The author presents a very comprehensive outline of the role of physical medicine and rehabilitation in chronic medical diseases. The specialty is defined and the scope outlined. The various sections of the PM&R service include physical therapy, corrective therapy, occupational therapy, manual arts therapy, educational therapy, and blind rehabilitation therapy.

Self-care activities are briefly discussed and the various apparatus and procedures available in a PM&R department are outlined. These include electrodiagnostic procedures, electromyography, sweating pattern tests, thermotherapy, cryotherapy, massage, therapeutic exercise, assistive and self-help devices, ultraviolet radiation, electrical stimulation, ultrasound therapy.

The application of apparatus and procedures to a number of chronic medical cases is outlined, including rheumatic diseases, cardiac disorders, brain and spinal cord lesions, poliomyelitis, amputations, peripheral vascular disorders, gastrointestinal disorders, asthma and pulmonary emphysema, pulmonary tuberculosis, the blind, diabetes mellitus, and dermatological conditions.

The necessity for a co-ordinated program of total treatment of the patient is stressed.

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**Painful Feet. Joseph C. Risser.** Postgrad. Med. **18**:416 (Nov.) 1955.

The author confines his discussion to a very common cause of foot pain, flat foot or pronated foot. Usage is very important to optimal functioning of any body part. The foot consists of two parts, the rearfoot consisting chiefly of the os calcis and the forefoot, the takeoff point which ends in the toes. The coming together of the rear and forefoot creates the longitudinal arch, the height of which is unimportant. The plantar fascia connects the fore and rearfoot. The junction between rear and forefoot is always one-third the distance from the tip of the heel to the tip of the great toe. This astragaloscaphoid junction has a circular-rounded joint and is the only joint allowing great motion between the forefoot and rearfoot, permitting either abduction or adduction. Abduction results in stretching of the plantar fascia which eventually becomes painful. Conversely, anything which decreases the integrity of the plantar fascia allows abduction of the forefoot.

Another factor militating against good foot-posture is contracture of posterior structures, the calf muscles and tendons. If the heel cord shortens, the foot cannot come down flat and the tibia leans backward. When that occurs, either the heel rises early in the forward step or the plantar fascia gives and the forefoot becomes abducted. Contractures tend to recur if the posterior structures remain unused and unstretched, especially in children in whom the tibia continues to grow and to increase the length of the leg. Under these circumstances talipes equinus and stretching of the plantar fascia occur, allowing forefoot abduction or if the plantar fascia is strong and does not allow forefoot abduction, there will be increased weight thrust on the metatarsal heads resulting in metatarsal calluses.

When a heel is put on a shoe, automatic dorsiflexion of the toes occurs, permitting the toes to come down in a level position. This stretches the intrinsic flexor muscles and prevents their utilizing the blood supply adequately. This initiates degeneration of soft tissues and cartilage about the joints with resultant pain. In 90 per cent of cases in which the foot turns out during walking, the leg on that side is longer. A method for measuring abduction of the forefoot is presented.

A well-fitted shoe has adequate space above the big toe and on the outer side for the toes to elongate. Shoe correction for pronation or abduction of forefoot should put the heel in varus position and the forefoot in valgus, thus creating the arch necessary to protect the plantar fascia from stretching. This is accomplished by using a shoe with a flexible shank with a rise at the forward inner corner of the heel and cutting back the heel on the outer side. Occasionally a lift on the outer side of the sole is necessary.

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**Cardiovascular Collapse in Acute Poliomyelitis. J. A. Hildes, et al.** Circulation **XII**:986 (Dec.) 1955.

A series of 22 fatal and 6 surviving cases of cardiovascular collapse in acute poliomyelitis is reported. The syndrome came on acutely within one to two days after the onset of bulbar paralysis. It was characterized by apprehension, hyperthermia, fast regular pulse, and was sometimes preceded by a short period of hypertension. It then progressed to a state of shock with cold, sweating, and cyanosed extremities. Pulmonary edema was a common terminal symptom.

Autopsy findings revealed involvement of the medulla in all cases and pulmonary edema was present in all but one case. Interstitial myocarditis was found in 75 per cent of cases.

Treatment with noradrenaline appeared to be of benefit in some cases, but this was usually transient. Four of the six surviving cases had a mild form of the syndrome, and it was not felt that therapy influenced these cases.

It is suggested that the mechanism for the syndrome is a combination of vasoconstriction resulting from a medullary lesion and a viral myocarditis. This leads to acute heart failure and pulmonary edema. The authors believe that other possible mechanisms leading to cardiovascular collapse were not present in their patients. These include hypoventilation from any cause, prolonged positive pressure breathing, severe hyperthermia, and acute adrenal insufficiency.

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**Studies of Intermittent Claudication. I. The Effect of Heparin in the Treatment of Intermittent Claudication. J. O. Godden; R. E. Hansen; E. A. Hines, and A. Christianson.** Proc. Staff Meet., Mayo Clin. **30**:437 (Oct. 5) 1955.

The authors' purpose was to investigate the effect of intravenous heparin on intermittent claudication. The claudication time was defined as "the time required for pain to develop in a patient walking on a level surface at 120 steps per minute." The rationale for the use of heparin in this experiment was the fact that it lowers the concentration of large lipoprotein molecules in the plasma which are typical for patients with atherosclerosis.

The experimental design involved three groups. The first group included 12 patients who walked twice daily for nine days. The first three days were the control period. On the second three days the patients received an injection of saline solution intravenously twice daily before the walks. On the third three days the patients received 50 mg. of heparin intravenously twice daily. The average claudication times were recorded for each three-day period.

Group two included 12 patients who were given 100 mg. of heparin intravenously twice weekly for eight weeks. The pre-treatment

control period was a daily walk for six days. The post-treatment control was obtained by averaging the six claudication times obtained at the bi-weekly walks during the sixth, seventh, and eighth weeks. Also used as a post-treatment control was a walk twice daily for three days following treatment.

Group three included six patients who were already in group two and who were followed on bi-weekly walks for another eight weeks on the same treatment. The pre-treatment control was the daily walk for six days as was the post-treatment control.

The most significant finding was that the post-treatment control time in group three correlated best with the pre-treatment control time. There was some moderate improvement in claudication times in only two patients. However, the authors did not consider this significant. Subjectively, all the patients felt that they were doing better because of the treatment. It is significant that almost all the patients had longer claudication times at sometime during the treatment than they did during the post-treatment control period.

If we are to accept evidence that lipoprotein deposits are subintimal in location then it is difficult to see how heparin will reverse this atherogenic process — even granting that it does lower the concentration in the serum of large lipoprotein molecules.

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**Peripheral Neuritis Following Isoniazid Therapy. Appearance of Dupuytren's Contracture and Raynaud's Phenomenon. Robert A. Hines.** J. A. M. A. **159**:1197 (Nov. 19) 1955.

Several articles have been published describing the neurotoxic effects of isonicotinic acid hydrazide. The disorder, as reported, is primarily peripheral in distribution, with stocking-and-glove-like sensory changes. Motor symptoms are generally mild.

The B vitamins, with the exception of pyridoxine, have been used to counteract these reactions. Biehl and Vilter have shown that in cases of neuritis caused by isoniazid there is an increased urinary excretion of pyridoxine. The excretion of pyridoxine increased proportionally with the dosage of isoniazid.

The author reports on three patients treated with isoniazid at the VA Hospital, Madison, Wis. They were given 3 to 5 mg. per kilogram of body weight. All three developed disabling contractures and Raynaud's phenomenon. The common physical findings were hyperthesia, cyanosis, trophic changes, and contractures.

That Dupuytren's contractures are seen in neurovascular disorders is a well-known fact. Whether this is due to a reflex discharge of sympathetic impulses in the upper extremities set up by pathological processes or whether it is due to direct stimulations of the autonomic nervous system has not been conclusively determined.

Of extreme interest was the fact that patients who were given supplemental dosages of pyridoxine did not develop any changes.

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**Further Evaluation of Heating by Microwaves and by Infrared as Used Clinically. Gordon M. Martin, and Julia F. Herrick.** J. A. M. A. **159**:1286 (Nov. 26) 1955.

Considerable confusion still exists regarding the comparative effectiveness of various sources of heat on human tissue.

The authors compared the effects of commercial microwave diathermy generators operating at 2450 megacycles with a wave length of 12.2 cm. in air and three commonly used sources of infrared energy. Infrared was supplied by a 250 watt reflector heat bulb; a 300 watt, ordinary frosted tungsten-filament bulb, and a 450 watt carborundum-rod unit. The first two units supplied short infrared energy and the third unit supplied far or long infrared radiation.

Thermocouples were inserted into the quadriceps femoris muscle to a depth of 5 cm. and temperatures were recorded before and just after a twenty-minute heating period. The microwave diathermy consistently raised the temperature of the muscle at 5 cm. depth to 40 C. (104 F.) when applied for 20 minutes. Infrared radiation, from the three standard sources did not produce consistently elevated temperatures at a depth of 5 cm.

This paper will help to clarify any confusion which may exist concerning the advantages of microwave diathermy.

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**Some Experience with Physical Disabilities from Chronic Illness in Old Persons. A. B. Chinn, and R. Mason.** J. Chron. Dis. **2**:534. (Nov.) 1955.

Observations on the physical disabilities of 100 unselected elderly patients with chronic disease are reported. Improvement in the 86 patients discharged (14 died in the hospital) was evaluated by assigning arbitrary numerical values to seven everyday functional capacities: Eating, bathing, dressing, walking, toilet, stairs, and continence. The patients showed considerable improvement in most of the daily requirements at the end of the hospital stay. For the most part, the 62 patients who survived for one year after discharge from the hospital retained the functional improvement acquired in the hospital. This sustained physical improvement is believed to have a significant socio-economic influence on the individual, family and community; thus, a suitable, but not prolonged, period of hospitalization for most elderly persons with chronic disease may be advisable.

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**Mental Deterioration in the Presenile Period. A. P. Noyes.** Am. Pract. & Digest Treat. **6**:1488 (Oct.) 1955.

Mental disturbances in the presenile period resulting from permanent, irreversible, and often progressive impairment of tissue function are discussed. These disorders may be divided into two groups: Cerebrovascular disturbances and disorders resulting from atrophy of the brain. Alzheimer's disease and Pick's disease are two disorders caused by atrophy of the brain. In Pick's disease, the atrophic processes are confined to one side, or both, of the frontal or temporal lobes, the two sides being affected equally. Widening of the intervening sulci and enlargement of the lateral ventricles, with loss in total weight of the brain, are characteristic pathological defects. The prominent histological feature is the falling out of ganglion cells. The symptoms of Alzheimer's disease, such as impaired mental and physical abilities, motor restlessness, impulsiveness, and aggression, are similar to those of Pick's disease, and the symptoms in both are insidious; however, sites of atrophy and histopathological changes differ. In Alzheimer's disease, the brain as a whole appears diffusely atrophic, with large numbers of senile plaques and innumerable nerve cells containing neurofibrils. A more frequent form of presenile mental disturbance is that resulting from cerebral atherosclerosis. Prodromal symptoms include fatigue, headache, dizziness, and insidious impairment of physical and mental abilities. Sometimes a sudden attack of confusion is the first obvious symptom. In the early stages of the disease, the patient may be painfully aware of his weakened capacities; in the later stages, the state of confusion may vary from indifference to violence. Similar, but generally milder, symptoms are noted in persons with circulatory disturbances.

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**The Geriatric Viewpoint of Chronic Illness Problems and Solutions. B. F. Rosenberry.** Pennsylvania M. J. **58**:1212 (Nov.) 1955.

Increasing numbers of lay, governmental, and medical groups are studying the problems of older people and literature on geriatrics is accumulating rapidly. Freedom from disease is only one factor in the happiness of the aged; others are a sense of well-being, a feeling of usefulness, and freedom from fear resulting from financial insecurity. More people are now dying of chronic diseases as advances in chemotherapy have decreased the death rate from infectious diseases; thus, a well-organized program of periodic health examinations, preferably starting in the fourth decade of life, should be developed. Special attention should be devoted to the detection of "degenerative" diseases and those involving metabolic changes. Periodic examinations are especially important in revealing cancer, which is sometimes cured in the early stages, and diabetes. Early correction of obesity and nutritional status may prevent the development of other disorders. Another problem in geriatrics is the long period of hospitalization of patients who could be working, in nursing homes, in their own home, or in one of their family's. Since financial difficulties often prevent this, suggestions for a voluntary plan of health insurance that would provide for treatment of illness after retirement are outlined.

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**Injuries of the Fingers and Hands: A Review of Cases from the Standpoint of Compensation. J. L. Barritt.** California Med. **83**:366 (Nov.) 1955.

In certain injuries of the fingers and hands observed by the staff of the California Industrial Accident Commission, the resulting disability seems unnecessarily high. Disability after amputation of a finger is often out of proportion to the loss because many surgeons do not resect enough bone to obtain an adequate flap, consequently, the resultant stump is too tender to be serviceable. Although grafts may look better, often the resultant saving in finger length is outweighed by loss of function.

Another frequent cause of disability is fibrosis, which results from immobilization in the presence of edema and causes limitation of motion. Fibrosis can be prevented by judicial balancing of rest and early mobilization. Elevation of the hand may help combat edema. To prevent stiffness in the uninjured joints, they must be put through their complete range of motion daily under supervision. Fibrosis can be minimized by maintaining the injured hand in the functional position.

Evaluation of loss of grip is one of the most difficult problems of industrial medicine. This loss can be determined to some degree by use of a dynamometer. Equal size of the arm and forearm are an indication of atrophy as the circumference of the major arm and forearm are consistently greater than the minor in persons doing active physical work.

Injuries to tendon and tendon sheaths caused by stress or strain are frequently overlooked by industrial physicians. The condition usually can be diagnosed by forced passive ulnar deviation while the thumb is clutched in a tight fist. The pain in a positive reaction is characteristic and can seldom be simulated. Treatment of tenosynovitis includes cessation of the activity which caused it and may require splinting or operation. Heat and physical therapy appear to be harmful.

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**Effect of Order of Drug Administration and Repeat Placebos on the Galvanic Skin Resistance in Human Subjects. D. J. Perry, et al.** J. Invest. Dermat. **25**:179 (Sept.) 1955.

The authors previously had found that the intramuscular administration of atropine in 10 subjects, as compared to that of placebos,

caused a significant increase in the galvanic skin resistance. This indicated that the technic could be applied to the study of certain other drugs. The present study was done to determine the effect of order of administration of drugs and the effect of repeated placebos on galvanic skin resistance.

Measurement of skin resistance was made by using a Wheatstone Bridge which was connected to a DC amplifier and direct writing oscillograph. Zinc-zinc sulfate electrodes were attached to the hypothenar eminence of the palm of each hand and the recording started. After a brief control period the substance was injected and the recording continued for 45 minutes. Calibrations were made prior to, in the middle of, and at the end of each experiment. Atropine, pilocarpine, and placebos were administered by injection in 24 white male subjects in a varied order. Ten subjects were tested following three injections of placebo.

Results, submitted to statistical analysis, indicated that the observed effects of the drugs were independent of the order of administration. Data resulting from the repeated injections of the placebo revealed that significant adaptation did not occur between tests.

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**Herniation of Intervertebral Discs. An Evaluation of the "Indirect Signs." A. J. Williams, and T. Fullenlove.** California Med. **83(6)**:433 (Dec.) 1955.

A study was made of the lumbar spine to determine what value the commonly accepted "indirect signs" might have on the diagnosis of herniated intervertebral disc. The "indirect signs" in a series of 200 men who had done heavy labor for over 10 years and who had never complained of back pain were compared with signs in 68 unselected cases who had been found to have herniated lumbar discs at operation.

The "indirect signs" that were considered and their percentage incidence in the two groups were as follows:

| "indirect sign" | 68 cases proved at operation | 200 symptomless laborers |
|---|---|---|
| 1. Narrowing of the disc space .... | 66.6% | 40% |
| 2. Flatness of the lordotic curve . | 25% | 22% |
| 3. Scoliosis ..... | 20% | 45% |
| 4. Localized hypertrophic spurs .. | 40% | 37% |

Although the occurrence of "indirect signs" is slightly greater with herniation of the intervertebral disc, it is not enough to warrant the conclusion that there is significant association. Furthermore, herniation of the disc at the level of a narrow intervertebral space occurred no more frequently than at a level of a normal interspace. At operation, only 50 per cent of the cases had herniation at the level of the narrowed interspace.

Accepting these "indirect signs" in the past as diagnostic of herniation has often led to unwarranted treatment. At best they can only point to degeneration of a disc, a condition of much less clinical importance.

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**Electrical Muscle Stimulation in Gynecology. A. P. Hudgins.** Am. Pract. Digest & Treat. **6**:1695 (Nov.) 1955.

Electrical stimulation of the perivaginal musculofascial structures, using low voltage surging AC current, was very helpful in correcting many gynecological complaints in a series of 88 patients. The results of therapy in various complaints and the number of patients with each complaint were not detailed.

The decision to try this type of therapy followed rather startling and prompt results in a stubborn case of stress urinary incontinence. Two surgical procedures and the Kegal perimeter therapy had been unsuccessful in correcting the condition in this patient. After four treatments and within 10 days, the perineal pads the patient had required constantly for 18 months were no longer necessary. She had accomplished urinary control.

The special cylindrical metal vaginal electrode, which resembles the large No. 4 Young's Rectal Dilator, was inserted high in the vagina. The inactive, moist flat electrode was placed on the lower abdomen. Surging AC current of the low voltage machine was used. The intensity was gradually increased until the muscular contractions were as strong as the patient could comfortably tolerate and the treatment continued for about 5 minutes thereafter. Treatments were repeated every two to seven days. Strong contractions about the vagina, rectum, and frequently the adductors of the thigh were produced. Voluntary contraction was encouraged with each current stimulation and voluntary active exercises were prescribed independent of stimulation 10 to 20 times, five times daily.

Purposes of the treatment are to strengthen the levator ani group and the intrinsic muscles of the vaginal wall; to accomplish certain physiological and functional effects such as breaking up of small scar tissue fixation bands; to teach the patient voluntary exercises and to supplement these exercises, and to increase the vascularity and circulation of the area.

The complaints which were chosen to receive this treatment included urinary stress incontinence; perineal pressure—dropped out feeling; pelvic pain; frigidity; localized vaginal tenderness or pain; genital relaxation; prolapsed uteri; coccyalgia, and dyspareunia. A short discussion of the indications and aims of this treatment in each of these conditions is presented.

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# Medical News

*Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.*

### Second Congress World Confederation for Physical Therapy

The Second Congress of the World Confederation for Physical Therapy will meet June 17-23, 1956, Hotel Statler, New York City.

The scientific program will include presentations on:

Anterior Poliomyelitis—The role of the physical therapist in the evaluation studies of the polio vaccine field trials.

Cerebral Palsy—Similarities and differences in methods of treatment.

Prosthetics—Recent research, prescription, fitting and training.

Bracing and Adaptive Devices for neuromuscular disorders.

Evaluation Procedures — Physical achievement, manual and electrical muscle tests, joint measurements.

Underwater Exercise — Physical principles and therapeutic use.

Posture Symposium.

Ultrasonics.

Physiological Basis for Heat.

Home and Convalescent Care Programs — including the severely disabled.

Antenatal and Postnatal Exercise.

The Physical Therapist—his education and responsibilities; his relationships to his fellow-workers and the community.

Seminar on Education.

### Membership Categories

Full Members—Physical therapists, occupational therapists, medical social workers, physicians, vocational counsellors, nurses, administrators of hospitals and rehabilitation centers, board and staff members of organizations interested in the handicapped.

Student Members — Students in the approved schools of physical therapy in the member organizations of the World Confederation for Physical Therapy.

Social Associates — Members of the family or friends of a full member. This will permit attendance at general meetings, visiting exhibits, and participating in a social program prepared for them during time of scientific sessions.

Additional information may be had by writing the Confederation at 1790 Broadway, New York City.

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### In Memoriam

Samuel Peskind, M.D., Cleveland: Western Reserve University School of Medicine, 1900; aged 77; died November 19, 1955; member of the American Congress of Physical Medicine and Rehabilitation, American Medical Association and Ohio State Medical Association. After completing his medical education he was a practicing physician for most of his professional career in Cleveland where he helped found the East 55th Street Hospital with his late uncle and his brother, Dr. Ben Peskind, who survives.

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### THE ISWC SEVENTH WORLD CONGRESS

The Seventh World Congress of the International Society for the Welfare of Cripples will be held in London the week of July 22-27, 1957. Held each third year, this conference brings together from every corner of the world doctors, social workers, surgeons, physical and occupational therapists, employment counselors, psychiatrists, artificial limb experts and others interested in services for the physically handicapped.

The International Society is advancing the rehabilitation of the world's crippled through its work with voluntary member organizations in fifty countries. Its global program is striving to bring about and stimulate total help for the handicapped child or adult by means of a world-wide exchange of students and experts, publications and professional knowledge; the specialized research of expert committees; regular world conferences; and by coordinating its aims with other organizations concerned with the general problem of disablement.

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### Columbia University and Institute for Crippled and Disabled to Conduct Course Emphasizing Actual Work With Clients

Applications are now being accepted for the third annual practical workshop on "Team Concepts and Techniques in Rehabilitation" to be held at the Institute for the Crippled and Disabled in New York City and conducted jointly with Columbia University, May 28 through June 22, 1956.

This year's course places heavier emphasis on working with clients. Enrollees will have

broad opportunity to practice their skills and professions on a team basis in collaboration with the Institute's comprehensive rehabilitation staff.

The course will include seminars in rehabilitation philosophy and principles, continuous case seminars conducted by the enrollees, and participation in the presentation of certain cases to the student seminar and to the Institute's staff case conference. Lectures and discussions by guest specialists and visits to other rehabilitation facilities in the New York area will be included.

Persons in the following categories will be considered for enrollment: physiatrists, psychiatrists and other medical specialties, psychologists, social workers, vocational counselors, placement workers, physical therapists, special educators, occupational therapists, workshop supervisors, administrators, speech therapists and group workers.

As in previous years, enrollment will be limited to 25 so as to assure personal attention by the participating Columbia and Institute staffs to the teamwork training of each enrollee. Special attention will be given to the role within comprehensive rehabilitation of the specialties and disciplines represented by those attending the course.

The fee for the course is $100. This does not cover such expenses as transportation and living costs. The Institute is endeavoring to arrange for a limited number of stipends payable at the conclusion of the course to help defray travel and residence expenses for those whose residence changes in connection with th course would work a financial hardship.

Persons interested in applying or obtaining further information should contact Dr. Abraham Jacobs, Department of Psychological Foundations and Services, Teachers College, Columbia University, New York 27, N. Y. Applications received by May 4, 1956 will be given preferential consideration.

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## Personals

**Herbert Kent,** Oklahoma City, presented a lecture to the Elk City County Medical Society on February 14. His topic was "Physical Medicine and Rehabilitation in the General Practice of Medicine."—The Department of Medicine of the University of Illinois held a seminar in December. A panel discussion entitled "Management and Rehabilitation of the Bedridden Patient" included **Maxwell D. Flank,** Hines, Illinois, as one of the participants. Dr. Flank took part in the meeting of the American Academy of Orthopaedic Surgeons held in Chicago early this year. He represented the specialty in a two hour color television instructional course, the theme of which was "Rehabilitation of the Paraplegia Patient." The exhibit "Lower Extremity — Temporary Training Prostheses (Pylon)" was presented at the meeting and Dr. Flank was one of the demonstrators. — **S. Malvern Dorinson,** San Francisco, was chairman of a medical symposium sponsored by the United Cerebral Palsy Association held in San Francisco, February 11. Dr. Dorinson presented the topic "The Child and the Problem." He also spoke on ultrasonic therapy at the annual meeting of The Northern California Rheumatism Association. — At the annual session of the Washington State Medical Association, Seattle, **Albert L. Cooper** of that city sponsored an exhibit entitled "New Methods of Treating the Painful Shoulder and Whiplash Injuries of the Neck." In January, Dr. Cooper discussed the topic "Diagnosis and Treatment of Back Pain" at the staff meeting of Providence Hospital in Seattle. The Doctors Hospital appointed him Chief of Physical Medicine in February of this year. Dr. Cooper participated in medical meetings early this year by presenting the following subjects: "The Contributions of Physical Medicine to Work Simplification" and "New Methods of Diagnosis and Treatment of Back Disabilities." — **Irvin Neufeld,** New York City, contributed the following chapter to the book entitled "Psychosomatic Aspects of Surgery" published by Grune & Stratton in February of this year "Recognition and Management of Post-traumatic Manifestations." — The fraternity, Phi Epsilon Pi, had as its guest of honor at a recent reception, **Arthur Steindler** of Iowa City. Dr. Steindler headed the department of orthopedic surgery at the State University of Iowa College of Medicine for many years. — The Latin-American Congress of Physical Medicine held its seventh meeting in Puerto Rico late in January, this year. The following Congress members took part: **Ferdinand F. Schwartz,** Birmingham, Alabama — Arthritis and Its Treatment; **Eugene H. Weissenberg,** Puerto Rico — Rehabilitation of Industrial Accident Cases in Puerto Rico.—**Constantine G. Psaki** and **R. J. Doman** of Philadelphia completed an eight hour orientation seminar in Physical Medicine and Rehabilitation to the graduate students School of Nursing, University of Pennsylvania and senior students of Chestnut Hill Hospital School of Nursing, as well as Hahnemann Hospital students of the School of Nursing. — **Joseph Benton,** New York City, has recently been advanced to Fellowship in the American College of Physicians. He has also been elected a Fellow of the American Public Health Association. — The Technical Advisory Committee of the Community Service Society appointed **Michael Dacso** of New York City a member. The committee will study the psychological, social and health problems associated with aging for a period of three years. — The Iowa State Medical Society held its 106th annual meeting in Des Moines, April 22-25. **W. D. Paul** and **David Paul** of Iowa City presented a scientific exhibit entitled "Adult Strumpell-Marie Arthritis"; another exhibit "Muscular Dystrophy" was sponsored by W. D. Paul and **J. I. Routh** of Iowa City and **M. K. Newman,** of Detroit. —

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### Course Available

The Cook County Graduate School of Medicine announces a two week intensive course in Neuromuscular Diseases of Children, with special emphasis on Cerebral Palsy, to be given by Doctor Meyer A. Perlstein for the two week period of June 18th to the 29th. This is an intensive didactic and clinical course designed for pediatricians, physiatrists, orthopedists, and neurologists interested in the care and treatment of children with neuromuscular handicaps. Emphasis will be placed on the practical clinical aspects of treatment and rehabilitation procedures. The course will include several field trips to demonstration clinics, and treatment centers. The fee for the course, which is $225, includes the cost of luncheons as well as the expenses of travels, meals, and accommodations on the various trips. Registration in the course is limited. For further information, write to John W. Neal, Registrar, Cook County Graduate School of Medicine, 707 S. Wood Street, Chicago.

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## NFIP CONFERENCE HELD

With the Creighton University acting as host university, the National Foundation for Infantile Paralysis held a conference on the Teaching of Rehabilitation to Medical Students, in Omaha on February 14, 15 and 16. Participants of the following medical school grantees were present: Cornell University, George Washington University, New York University, University of Pennsylvania, University of Buffalo, Marquette University, Tulane University, Yale University, University of North Carolina, Stanford University, Western Reserve University, University of Minnesota, and Creighton University. Members of the staff of the National Foundation for Infantile Paralysis and its Medical Advisory Committee were also present at the Conference. Guest speakers were Maurice Grossman, M.D., Assistant Clinical Professor of Physical Therapy at Stanford University, Clinical Instructor in Psychiatry at the University of California, and Psychiatrist, Medical Advisory Board, California Bureau of Vocational Rehabilitation; Edward Stainbrook, M.D., Professor of Psychiatry, College of Medicine at Syracuse, State University of New York; and Mr. Basil O'Connor, President of the National Foundation for Infantile Paralysis.

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### Newly Registered Therapists

**January 3, 1956**

Carpenter, Mary Evelyn, Seward, N. Y.
Stopielo, Joan C., 363 State St., Albany, N. Y.

**January 10, 1956**

Frampton, Gerald M., 103 Arlington Ave., Colonial Heights, Va.

**January 16, 1956**

Dixon, Kathleen K., 707 Venable Ave., Baltimore, Md.
Hoopes, Patricia Walther, 16803 Melgrave Ave., Cleveland
Secoy, Jo Ellen, 1285 York Lane, Troy, Ohio

**January 20, 1956**

Chase, Marian F., 152 W. Pacemont Rd., Columbus, Ohio
Hoopes, David T., 136 E. Washington St., Chagrin Falls, Ohio
Kellermeyer, Audrey S., 470 Braddock Ave., Uniontown, Pa.
Labella, Gaspare J., 761 Sandy St., Norristown, Pa.
Rogers, Patricia Anne, 325 Short St., Bucyrus, Ohio
Stoner, Pauline F., 226 Clymer St., Reading, Pa.
Voth, Mary Ann, 705 Merriman Rd., Akron, Ohio

**January 25, 1956**

Carr, Doris T., 656 N. Cummings St., Los Angeles
Consiglio, Virginia E., 53 Washington Sq. S., New York
Fisher, Oral E., 119 N. Boyle Ave., Los Angeles
Forsyth, Walter Lee, 1720 Brooklyn Ave., Los Angeles
Jasper, Edward H., College of Medical Evangelists, School of Physical Therapy, Loma Linda, Calif.
Kurtz, Judith M., 1035 Washington Ave., Brooklyn
Kyle, Robert S., 318 S. E. Sixth St., College Place, Wash.
Pichly, Andre L., Jr., 1124 Tenth Ave., Sacramento, Calif.
Simmons, Raymond E., Box 623, Loma Linda, Calif.
Viik, Inge M., 542 W. "D" St., Ontario, Calif.
Wat, Bo Sam, 120 Starr St., PO Box 189, Loma Linda, Calif.
Yeager, Ruth E., Box 523, Westfield, Pa.

**January 27, 1956**

Cain, Betty Jean, Box 369, Huttig, Ark.
Favrod-Coune, Claire C., 68 Myrtle St. Boston
Frost, Prudence P., 511 Newtown Rd., Littleton, Mass.
Greathouse, Linda H., 2251 Washington Ave., Fort Worth, Texas
Ketterer, John F., 87 Tilden Rd., Scituate, Mass.
McClain, William M., Rt. 2, Troy, Texas
Mickens, Mary Helen, 4001 Lyons, Houston, Texas
Pennebaker, Judith, Box 155, Jackson, La.
Unger, Patricia L., 209 Intervilla Ave., West Lawn, Pa.

**February 1, 1956**

Korobkin, Hannah R., 291 Trafton Rd., Springfield, Mass.
Krenicki, Stephanie M., 78 N. Main St., Terryville, Conn.
Luria, Sara, 201 Colony Rd., New Haven, Conn.
Messenger, Nancy E., 20 Scarsdale Rd., West Hartford, Conn.
Miceli, John J., 21 Spring St., New London, Conn.

Mohr, Joan D., Imperial Ave., Westport, Conn.
Paine, Patricia E., 155 Ohio Ave., West Springfield, Mass.
Rosenthal, Joan, 1990 Ellis Ave., Bronx, New York
Slivinsky, Joseph J., RFD No. 3, Coventry, Conn.
Smith, Charlotte, 194 Benham, Torrington, Conn.
Tucker, Kathleen, Waitsfield, Vt.

**February 10, 1956**

Appleyard, Milton H., 47 Brooklyn Ave., Youngstown, Ohio
Benesch, Carlton E., 43 Clinton St., Binghamton, N. Y.
Hopson, Bettye L., PO Box 922, Tuskegee Institute, Ala.
Kamens, Prudence Ann, RFD 3, Fairfield, Conn.
Mancusi, Mario M., 789 Shepherd Ave., Brooklyn


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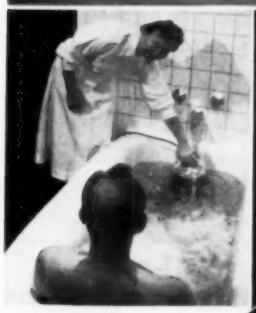

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*For further information contact:*

**ROBERT L. BENNETT, M.D.**
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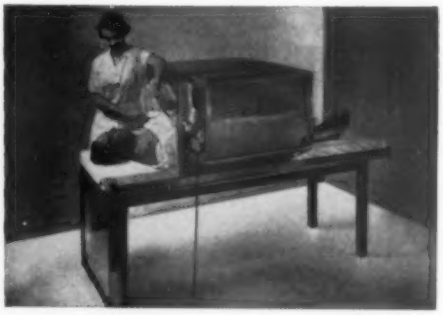

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**NURSES:** One month, July 23, 1956. Possibly repeated in October.

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**PHYSICAL THERAPISTS:** (c) Chief male physical therapist; duties consist of supervising work of other therapists, treating patients under physicians' orders; fully approved 400-bed general hospital; California. (d) To serve as administrator of new rehabilitation center for children; 38-bed unit, university medical center; rank: assistant administrator in charge of rehabilitation center; unusual opportunity. For further information regarding these opportunities, please write Burneice Larson, Medical Bureau, Palmolive Building, Chicago.

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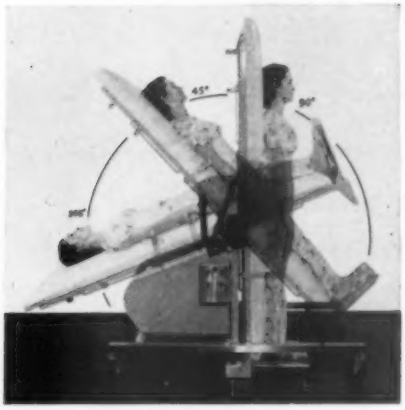

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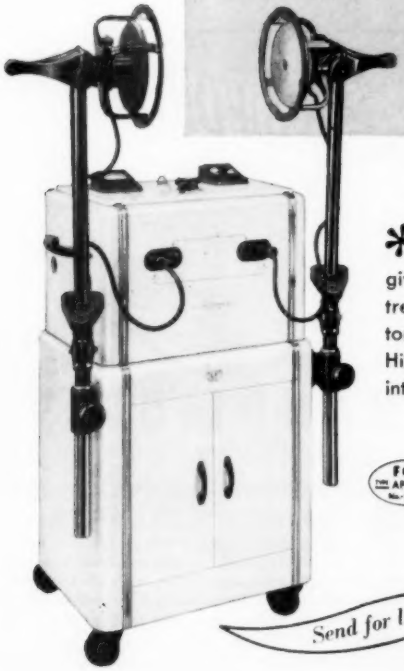

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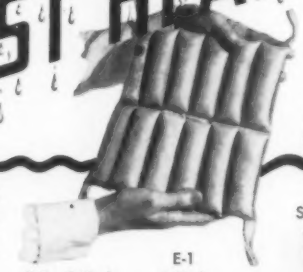

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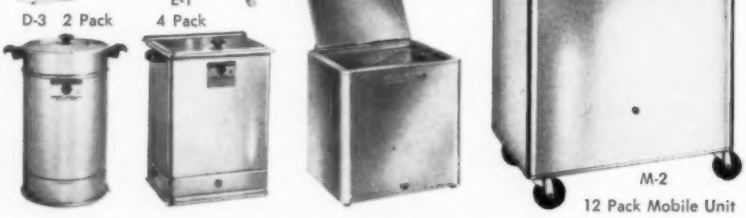

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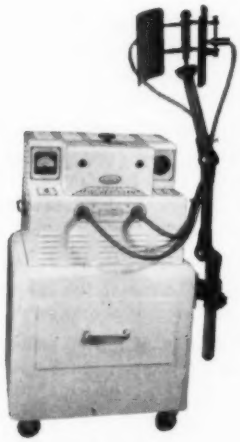

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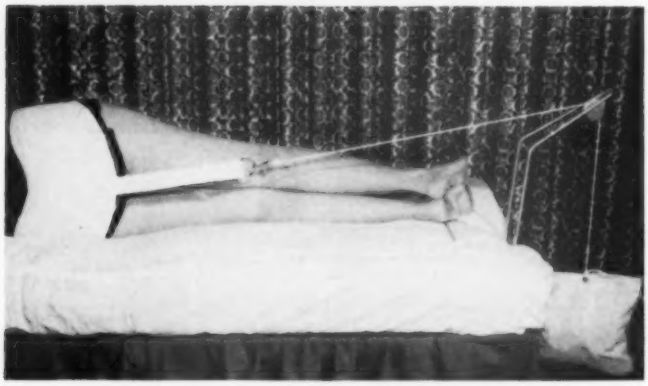

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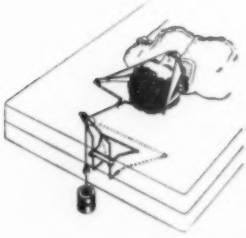

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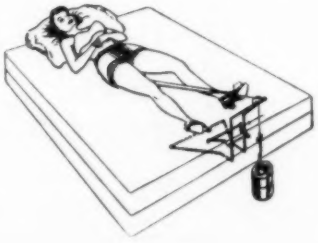

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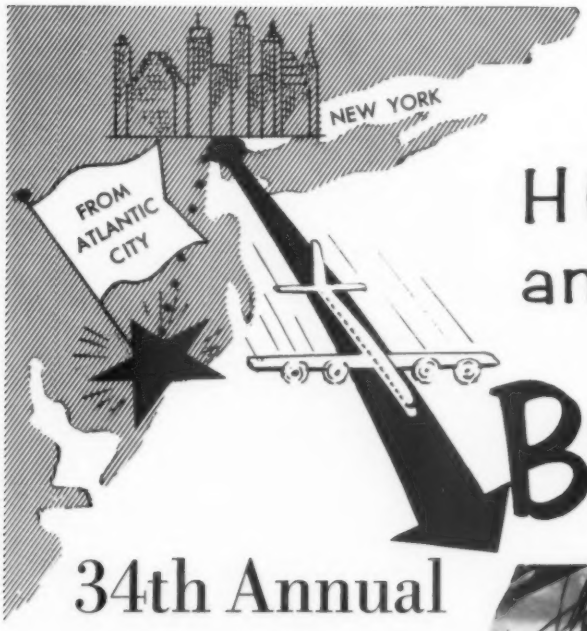


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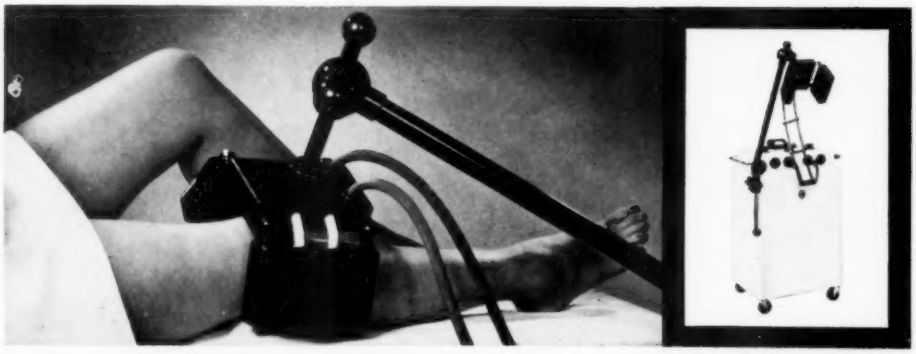

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